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Report of the

AD HOC CONSULTATION ON THE ROLE OF REGIONAL FISHERY AGENCIES IN RELATION TO HIGH SEAS FISHERY STATISTICS

La Jolla, California, USA, 13-16 December 1993

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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Rome, 1994

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PREPARATION OF THIS REPORT

This is the Report of the *Ad hoc* Consultation on the Role of Regional Fishery Agencies in Relation to High Seas Fishery Statistics, La Jolla, California, 13-16 December 1993. The Report was adopted by the *Ad hoc* Consultation on 16 December 1993.

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ABSTRACT

The *Ad hoc* Consultation on the Role of Regional Fishery Agencies in Relation to High Seas Fishery Statistics, was held at the Headquarters of the Inter-American Tropical Tuna Commission (IATTC), La Jolla, California, USA, on 13-16 December 1993. The *Ad hoc* Consultation was organized by FAO. The following items were discussed: review of statistics reported on high seas fisheries and presently collated by regional fishery agencies; specification of the requirements for statistics on high seas fisheries for research and management purposes; logistical and financial implications associated with data collection; advice on the high seas fishery statistics to be collected and disseminated by FAO; reporting of high seas fishery statistics and exchange of data between regional fishery agencies and FAO; the Coordinating Working Party on Atlantic Fishery Statistics (CWP), and its possible extension to areas outside the Atlantic Ocean; exchange of information between FAO and regional fishery agencies concerning the authorization of vessels to fish on the high seas.

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OPENING OF THE CONSULTATION

1. The Consultation was held at the Headquarters of the Inter-American Tropical Tuna Commission (IATTC), La Jolla, USA, from 13-16 December 1993. Fourteen participants from regional fishery agencies[1/] attended the Consultation. In addition, three observers attended the Consultation. The terms of reference for the Consultation are given in Appendix A. The List of Participants is in Appendix C.

2. The Secretary of the Consultation, Dr. R. Grainger, welcomed participants to La Jolla, and presented an Opening Statement on behalf of Dr. W. Krone, Assistant Director-General a.i., Fisheries Department, Food and Agriculture Organization of the United Nations (FAO). The full text of the opening statement is in Appendix E.

ADOPTION OF AGENDA AND WORKING ARRANGEMENTS

3. The Consultation adopted the Agenda shown in Appendix B. The documents placed before the Consultation are listed in Appendix D.

APPOINTMENT OF CHAIRMAN

4. Dr. James Joseph, Director, IATTC, was appointed Chairman of the Consultation.

5. The Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, His Excellency Mr. Satya Nandan, spoke at the beginning of the meeting. He congratulated Dr. Joseph on his appointment as Chairman of the Consultation and expressed thanks to FAO for the invitation to participate in the Consultation. Ambassador Nandan noted that he valued such participation, as the deliberations at the Consultation were central to some of the technical issues being addressed by the UN Conference. He pointed out that regional fishery agencies would be expected to play a crucial role in the future conservation and management of straddling fish stocks and highly migratory fish stocks. He added that the collection of high seas fisheries data was not an end in itself, but rather a means of trying to ensure that straddling fish stocks and highly migratory fish stocks could be effectively conserved and managed over their entire ranges.

REVIEW OF THE STATISTICS REPORTED ON HIGH SEAS FISHERIES WHICH ARE PRESENTLY COLLATED BY REGIONAL FISHERY AGENCIES

6. The Chairman of the Consultation pointed out that the task of the Consultation would be essentially to consider two levels of statistical information: (i) data of a fine resolution that regional fishery agencies would require for stock assessment, management and related purposes, and (ii) aggregated data relating to high seas catches, species composition, effort,

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1/ For the purposes of this report, regional fishery agencies are taken to be intergovernmental fishery bodies, established both within and outside the framework of FAO, which are concerned with research and/or management of fisheries for a particular region.

etc., that could be compiled by FAO to be made available to the international community. In this respect aggregated data held by FAO would generally not be used for stock assessment purposes.

7. The Chairman summarized the introductory paper for Agenda Item 4 (Doc.5; see Appendix F) noting that it provided guidance for the ensuing presentations by the participants from the regional fishery agencies and subsequent discussion. He added that there was a high degree of variability in high seas fishery data between regions, and a large variation in the extent to which particular high seas fish stocks were covered by regional fishery agencies. The Chairman indicated that an attempt should be made in the Consultation to identify those areas where there was inadequate or no coverage of high seas fish stocks by regional fishery agencies.

8. Participants from the regional fishery agencies were then invited to make short presentations highlighting their agency's high seas fishery statistical activities.

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

9. Most of the area covered by the CCAMLR Convention is high seas (Doc.5.A; see Appendix G). Data collected by the Commission, which are supplied by Members, are used for stock assessment purposes, for the operational management of fisheries, for the assessment of incidental mortality of marine mammals and birds, and for the calculation of annual financial contributions by Members. Quotas are not specified by the Commission for management purposes, though catch limitations and other criteria taking account of incidental species mortality are used. The Commission has a scientific observer programme in which observers are placed on vessels operating in the Convention area. The purpose of this programme is to facilitate collection of data from commercial sources and scientific research vessels. Management in the Convention area takes into account commercially targeted as well as related and dependent species, i.e. an ecosystem approach. The total cost for data management is approximately US$32 000.

South Pacific Forum Fisheries Agency (FFA)

10. Approximately 19 percent of the region served by the FFA is high seas. Tuna is the most important commercial species harvested in the region (Doc.5.C; see Appendix H). Some 94 percent of catches are taken by distant water fishing fleets. The FFA is primarily concerned with the economic and policy aspects of management and to this extent the Agency complements the work of the South Pacific Commission (see paragraph 16) which is directed towards research. High seas fisheries data are of particular importance to FFA Members for the successful implementation of regionally agreed arrangements concerning monitoring, control and surveillance (MCS), and to enable FFA Members to assess the relative economic benefits distant water fishing fleets derive in having access to their EEZs. All vessels fishing within the FFA region are required to provide complete and accurate fishing details, including high seas activities, in compliance with the regionally agreed minimum terms and conditions of access. The FFA maintains three databases: the regional register database, the regional tuna fisheries logsheet database, and the US Treaty catch database. Under the provisions of the US Treaty there is an observer programme which currently covers 20 percent of trips by US vessels. In addition, the US National Marine Fisheries Service

(NMFS) conducts port sampling at designated ports for tuna harvested in the region. FFA Members plan to progressively extend the observer and port sampling arrangements to other distant water fishing fleets operating in the region. At the present time approximately US$278 000 is devoted to fisheries data management.

Inter-American Tropical Tuna Commission (IATTC)

11. The IATTC was established in 1950 with a mandate to study the biology of tunas, billfishes and other kinds of fish taken by tuna fisheries in the eastern Pacific Ocean and to recommend conservation measures required to ensure that these exploited species are maintained at levels which will provide maximum sustained harvests (Doc. 5.D; see Appendix I). In 1976 the IATTC was delegated additional responsibility for the stocks of dolphins and other marine mammals taken in conjunction with the fishery for tunas. The IATTC maintains its own data collection systems and obtains data directly from vessels, vessel and transshipment agencies, canneries, and from various other agencies, among other sources, and its records of tuna fisheries catch and effort extend from 1931 to the present. The IATTC abstracts vessel logbooks to obtain catch and effort data, and their logbook database covers between 80-90 percent of total tuna catches in the region. Their landings database covers about 95 percent of the total catch from the region. Data collected are used for stock analyses necessary to meet the cited conservation and management purposes, and for the determination of Members' contributions to the Commission. Additional programmes and studies required to support stock analyses and conservation and management purposes are routinely undertaken. The Commission deploys observers on vessels operating on the high seas as part of its dolphin programme. This observer programme provides 100 percent coverage of all vessels greater than 400 short tons carrying capacity. Strict confidentiality standards are maintained with respect to information collected, and data are not released in a form which would reveal the operations of individual vessels or companies. IATTC also maintains registers relating to the characteristics of fishing vessels (as a means of determining fishing power) and of skippers, since individuals often move from vessel to vessel and this can affect the fishing performance of a vessel. Excluding the scientific observer programme, IATTC's cost of obtaining, analyzing and disseminating high seas fishery statistics was approximately US$512 000 in 1993.

International Commission for the Conservation of Atlantic Tunas (ICCAT)

12. The Commission has competence for tuna management in the Atlantic Ocean and in its adjacent sea, e.g. the Mediterranean Sea (Doc.5.E; see Appendix J). In collecting data, no distinction is made between zones of national jurisdiction and the high seas. Data (catch, fleet composition, catch and effort, biological) are collected by Members of the Commission and in turn provided to it. Some sampling for scientific purposes and for supplemental statistics not covered in national statistics is undertaken by ICCAT but this activity is declining. A number of non-contracting parties operate in the area covered by the Commission. Some of these parties cooperate with ICCAT, FAO or the General Fisheries Council for the Mediterranean (GFCM) in supplying catch and related data. ICCAT roughly estimates that about 40 percent of total tuna catches come from the high seas. A number of problems are being encountered by the Commission, including (i) a lack of capacity by some countries to report catches, misreporting of catches and misidentification of species, and (ii) fishing activities by non-contracting parties that undermine the Commission's

management efforts. These activities are particularly problematic with respect to northern bluefin and measures have been adopted by ICCAT to minimize them. Currently it is estimated that approximately US$83 000 is devoted annually to the management of high seas fisheries data.

International Council for the Exploration of the Sea (ICES)

13. ICES provides statistical and management advice to three commissions [the North-East Atlantic Fisheries Commission (NEAFC), the International Baltic Sea Fisheries Commission (IBSFC) and the North Atlantic Salmon Conservation Organization (NASCO)] and to Members (Doc.5.F; see Appendix K). There are three high seas areas within the ICES area. Catches from these areas are small in relation to total catches taken in the area but the statistics for the high seas are not reported separately. Data are provided to the Council by Members. Consequently there is a high degree of dependence on national statistical reporting. Misreporting and under-reporting of data are apparent and ICES is taking steps to address this problem. Such inaccurate reporting undermines the Council's capacity to undertake stock assessments and to provide quality advice to the Commissions and Members. The STATLANT 27B reporting system has been abandoned because of late or non-compliance by Members and the fact that the data reported were not sufficiently detailed for ICES' needs. Similar data are now being obtained directly from scientists in the form needed to carry out assessments and analysis. It is estimated that approximately US$7 300 annually is devoted by ICES to the collecting, processing and distribution of high seas fisheries data (estimated at 5 percent of the total expenditure on fisheries statistics).

Indo-Pacific Tuna Development and Management Programme (IPTP)

14. IPTP has been collecting data on tuna and tuna-like species since 1982 but data sets go back to 1954 when the first longline fishery commenced (Doc.5.G; see Appendix L). The Programme's competence covers the Indian Ocean and parts of the Western Pacific adjacent to the Philippines and Indonesia. The functions and activities of the IPTP relating to the Indian Ocean will be taken over by the Indian Ocean Tuna Commission (IOTC) when it is operationally established. The data compilation for the Western Pacific will be ensured by Southeast Asian Fisheries Development Centre (SEAFDEC). The Programme has almost 100 percent catch coverage for the purse seine fleets operating in the Indian Ocean though coverage of catches by longliners is lower. The main statistical problems concern (i) the non-submission of longline catch returns in a timely manner (2 year delays are common), and (ii) the rapid expansion of longline fishing in the IPTP area (vessels less than 50 GRT). It is estimated that 600-700 of these vessels are now operating in the Indian Ocean and they are not reporting their catches. Most of these vessels are from China (Province of Taiwan). Some of them operate under joint venture arrangements with countries in the region. In addition, misidentification of species in catch reporting is common in artisanal fisheries, which account for two-thirds of the tuna landings in the Indian Ocean. For practical reasons it may also be necessary to adjust the boundaries of FAO Major Fishing Areas for Statistical Purposes to bring them in line with national and stock boundaries. It is estimated that the cost to IPTP of collecting, processing and verifying catch data would be approximately US$525 000 per annum.

Northwest Atlantic Fisheries Organization (NAFO)

15. The International Convention for the Northwest Atlantic Fisheries came into force in 1979 replacing the International Commission for the Northwest Atlantic Fisheries (ICNAF) which had operated in the area since 1950 (Doc.5.H; see Appendix M). NAFO collects a wide range of data and it is disseminated in a range of formats. Data collected are used for stock assessment purposes. These data are supplemented by sampling data and the maintenance of information on fishing vessels. NAFO's Scientific Council agreed in 1991 to separate catches from EEZs and the high seas. Consequently, separate databases will be maintained in future. The operation of non-contracting parties in NAFO's regulatory area poses a problem for fisheries conservation and management. NAFO has introduced a hail system which requires contracting party vessels to report prior to entering and leaving fishing zones. This system is supported by joint international inspection and surveillance. It is estimated that the cost of managing data in the NAFO area would be approximately US$170 000 annually.

South Pacific Commission (SPC)

16. High seas catches of the four principal tuna species in the SPC statistical area may account for as much as 30 percent of the total catch which amounted to 1.1 million mt in 1992 (Doc.5.I; see Appendix N). High seas catches in the SPC area are taken primarily by distant water fishing fleets. The Tuna and Billfish Assessment Programme (TBAP) is responsible for collecting three types of catch and effort data: logsheet data, aggregated data and total annual catches. Logsheet data, which cover catch and effort data on a daily or set by set basis for individual vessels, are provided to SPC by Members. The logsheet data cover the EEZs of SPC countries; they do not cover the high seas, except for logsheet data covering the US purse seine fleet, for which high seas data are provided under the terms of the US Treaty with South Pacific countries. Aggregated catches and effort data are provided by distant water fishing fleets; these data cover both EEZs and high seas (although not separately). SPC currently holds most aggregated data covering the SPC area. Exceptions are purse seine and recent longline data held by the National Fisheries Research and Development Agency of the Republic of Korea. Total annual catches in the SPC area, by fleet, are estimated by the TBAP either from aggregated data or from other sources. Few data are available on by-catches and discards, although observer coverage is increasing. Verification of logsheet data through port sampling is increasing as a result of the ban on high seas transshipment that was recently imposed by Members of the South Pacific Forum. The cost of maintaining database systems at SPC (which also include tagging, length frequency and oceanographic data) amounts to about US$180 000 annually, although the costs of establishing these databases were considerably higher.

North Pacific Anadromous Fish Commission (NPAFC)

17. The NPAFC was established in 1993 to replace the International North Pacific Fisheries Commission (INPFC) (Doc.5.J; see Appendix O). NPAFC's Convention prohibits high seas salmon fishing. The Commission does not maintain a computer database but receives high seas fisheries data in hard-copy from Japan for dissemination to Members. It is estimated that NPAFC's annual cost of data management for high seas fishery statistics for 1990 was US$700.

FAO Regional Bodies

18. Only two FAO regional fishery agencies have responsibilities for the collation and dissemination of fishery statistics for marine areas (Doc.5.K; see Appendix P). These bodies are the General Fisheries Council for the Mediterranean (GFCM) and the Fishery Committee for the Eastern Central Atlantic (CECAF). Most of the GFCM area is high seas. It is also an important spawning area for northern bluefin. There are few demersal straddling stocks in the GFCM area because of narrow shelf areas. It is estimated that 25 percent of catches (by weight) in the GFCM area are taken on the high seas. In the CECAF area most catches are taken in EEZs, but high seas and EEZ catches are not reported separately. However, it is estimated that only seven percent of catches in the CECAF area are taken on the high seas. At the present time FAO regional fishery agencies are being (i) examined to assess their conservation and management effectiveness, and (ii) evaluated vis-a-vis possible options for re-structuring, in the light of developments at the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks. For the GFCM and CECAF areas combined it is estimated that the annual cost of managing high seas fisheries data would be approximately US$30 000.

General comments

19. A table summarizing details of the agencies' statistical programmes is given in Appendix Q.

20. Following the presentation of statements by participants, it was noted that the following areas and major species are not covered at the present time by active fishery agencies. These are the North Pacific (Alaska pollack), the Southwest Atlantic (hakes and squid), the Southeast Atlantic (horse mackerel and cape hakes), the Southwest Pacific (orange roughy), the Southeast Pacific (Chilean jack mackerel) and the Northwest Pacific (tuna).

21. The Consultation recognized a number of problems that affect regional fishery agencies with respect to the acquisition, analysis and dissemination of high seas fishery data. These problems include:

(i) the non-submission of data and the failure to submit adequate data in a timely manner;

(ii) the lack of data collection systems at the national level (this problem is particularly pronounced for small-scale fisheries);

(iii) the inaccurate compilation of data at the national level;

(iv) the use of incorrect conversion factors for estimating nominal catch[1/];

1/ The nominal catch is the live weight equivalent of the landings, estimated by applying an appropriate conversion factor to the landed product weight.

(v) the lack of appropriate biological sampling systems at the national level;

(vi) intentional or unintentional misreporting of catches and species;

(vii) misidentification of species and a lack of separate reporting of mixed species catches;

(viii) the lack of submission of data and related fishing information to agencies by non-contracting parties and by vessels flying flags of convenience; and

(ix) the lack of data on discards.

SPECIFICATION OF THE REQUIREMENTS FOR STATISTICS ON HIGH SEAS FISHERIES FOR RESEARCH AND MANAGEMENT PURPOSES

22. The Chairman introduced Agenda Item 5 based on the working paper before the Consultation (Doc.6; see Appendix R). The Consultation recognised that regional fishery agencies are major users of fishery statistics, both for stock assessment and management purposes, and that they should, in consultation with their member countries determine what data are collected.

23. The Consultation welcomed the specification of the roles of regional fishery agencies and flag States in the collection and exchange of data necessary to meet stock assessment requirements and support managegement objectives as provided in the Negotiating Text prepared by the Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks at the second session of the Conference in 1993. It particularly welcomed the stipulation of minimum data requirements in Annex 1 to the Negotiating Text (Appendix S) which provides an important specification of the "data relevant to the conservation of of fish stocks" as referred to in the 1982 Convention Article 119(2) as well as the general data requirements specified by the FAO Technical Consultation on High Sea Fishing. It also takes into account the action and cooperation needed to address the inadequacies in fisheries statistics and data handling systems for the high seas as noted by the UN Conference on Environment and Development.

24. Annex 1 of the Negotiating Text defines the general principles to be considered, the basic requirements for fishery, scientific and vessel data and procedures for data reporting, validation and exchange. The Consultation agreed that there is a need to allow flexibility in standards in order to take account of the differing needs by region and species, but that Annex 1 provides a common framework for specifying standards. It was agreed to use Annex 1 as a basis upon which to elaborate the data requirements.

25. Recognising the need for adequate data to be collected throughout the range of a stock, the Consultation decided to consider the data requirements for the conservation and management of straddling fish stocks and highly migratory fish stocks as a whole, and not

just the requirements for high seas fishery data. It was considered important that common standards should apply to both EEZ and high seas areas.

26. The Consultation recognised that reliable data on discards are essential and that the current availability of such data is problematical. It was noted that some states and regional fishery agencies currently obtain discard data from observer programmes, and it was recognised that the use of observers is the optimum method to obtain such data. The Consultation recommends that discard statistics be collected by national authorities and regional fishery agencies and that, where possible, their collection or validation should be through the use of observer programmes.

27. The Consultation agreed that a minimum statistical requirement should be the provision of nominal catch[1/] in terms of weight or numbers together with factors which allow the numbers to be converted into equivalent weight. The nominal catch statistics should be accompanied by discard statistics and both should be specified by species, flag of vessel, gear type, FAO major fishing area (or where this is not possible, as close an approximation as is possible), time and stock. These are required so that the total quantities of fish removed as a result of fishing activities can be specified. For areas where regional fishery agencies have responsibilities, the "stock" is as determined by those agencies. For areas where no regional fishery agency exists, it is recognised that stock data may not be available. The time unit used for reporting these nominal catch and discard data should be calendar year or by a shorter time period. For seasonal fisheries which straddle two calendar years, the statistics should be provided both in terms of calendar year and fishing season. The nominal catch and discard statistics reported should correspond to the total catches (retained and discarded) for the relevant country; therefore, any statistics obtained by means of sampling rather than census should be raised to the total.

28. The Consultation agreed that another minimum statistical requirement is for effort and associated catch data. Effort data are required for three main purposes: (i) for assessment purposes as an index of fishing mortality and for deriving abundance indices, (ii) for economic analysis, and (iii) for management purposes. For effort and associated catch data, a finer level of spatial and temporal detail is required than for the nominal catch and discard statistics.

29. The Consultation agreed to adopt with some modification the classification of fishing gears and associated units of effort as specified by the Ninth Session of the Coordination Working Party on Atlantic Fishery Statistics (CWP) (17-23 August 1977, Dartmouth, Nova Scotia, Canada) and these are shown in Appendix T. Five levels of priority are specified, each with different effort descriptors, depending on what data are available. The catch (fish and non-fish) associated with the effort should be reported as nominal catch in terms of weight or numbers together with appropriate conversion factors and with corresponding data for discards. Catches should also be reported, and classified as retained catch or discards, as appropriate. The catch data by species and associated effort should be reported by flag of vessel, vessel size class, gear type, area and time. The area and time strata cannot be specified in general terms because the requirements will vary greatly depending on the

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1/ For all species retained, irrespective of whether they are target or non-target species.

geographic distribution and seasonality of the fishery. It was therefore agreed that the area and time strata should be adequate to describe the fisheries in sufficient detail, to identify stock structures, to permit the calculation of fishing power and to separate high seas and EEZ components of the fisheries. Where regional fishery agencies exist, they should specify the resolution of the data to be provided. For other areas, national authorities should adopt criteria based on the resolution used by regional fishery agencies in adjacent areas and for similar stocks. These effort and associated catch data may be collected by sampling rather than census, and when based on sampling, the proportion of the vessel/gear stratum which has been sampled should be specified.

30. Due to the complexities and difficulties in defining, collecting and interpreting economic data, the Consultation did not have sufficient time to consider this matter in detail. It was recommended that FAO should have the question of requirements for economic data investigated in an appropriate forum involving regional fishery agencies. It is important that the national collection of economic data should be continued.

31. The Consultation further agreed that these minimum standards should apply to all flag States, and not just to Members of regional fishery agencies.

32. The Consultation believed that biological data are essential for stock assessment purposes and should be included in the minimum requirements. It was agreed that length compositions or weight compositions with associated weight/length conversion information for retained and discarded components of each species should be included in the minimum requirements. For some stocks or species additional data, including sex, age, and maturity compositions, are required for assessment purposes, and in such cases these data should also be included within the minimum requirements. The provision of biological parameters supporting stock assessments and the undertaking of other relevant research, including tagging experiments, surveys of abundance, biomass surveys, hydro-acoustic surveys, research on environmental factors affecting stock abundance, and oceanographic and ecological data are also very important.

33. Vessel data are important for management purposes and for the verification of catch and effort data. The Consultation agreed that the minimum requirements for data on all vessels fishing on the high seas, irrespective of size, should include as essential the items specified in the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, under Article VI paragraph 1 (Annex to Doc.11; see Appendix Y). These essential items are:

(a) name of fishing vessel, registration number, previous names (if known), and port of registry;
(b) previous flag (if any);
(c) International Radio Call Sign (if any);
(d) name and address of owner or owners;
(e) where and when built;
(f) type of vessel;
(g) length.

34. The Consultation also agreed that the items listed in paragraph 2 of the same Article should be provided to the extent practicable. In addition, it was agreed that the fish preservation method (freezing in brine, drying, etc.), the hold capacity (in cubic metres), the rated speed (in knots) and the vessel marking (as referred to in paragraph 6 of Article III of the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas) should also be included in the list of items to be provided to the extent practicable. Thus the items which should be provided to the extent practicable are:

(a) name and address of operator (manager) or operators (managers) (if any);
(b) type of fishing method or methods;
(c) moulded depth;
(d) beam;
(e) gross register tonnage;
(f) power of main engine or engines;
(g) fish preservation method;
(h) hold capacity;
(i) rated speed;
(j) vessel marking.

LOGISTICAL AND FINANCIAL IMPLICATIONS ASSOCIATED WITH DATA COLLECTION

35. The Chairman introduced the paper for this Agenda Item (Doc.7; see Appendix U) and the Consultation agreed that the following issues would be considered: (i) confidentiality of data, (ii) verification of data, (iii) timeliness of the submission of data, and (iv) the costs of collection, collation and dissemination of data.

Confidentiality of data

36. National authorities and regional fishery agencies have clearly established policies and standards with respect to maintaining the confidentiality of catch and related data. Such confidentiality is essential to (i) maintain the full cooperation of industry and national statistical reporting offices in the provision of timely data, and (ii) to ensure the reliability of data.

37. The Consultation agreed that the primary responsibility for ensuring confidentiality of data provided to FAO should remain with the national authorities and regional fishery agencies. Consequently, such data provided to FAO would need to be in aggregated formats. This would be necessary because FAO generally disseminates data to the international community without restriction. The Consultation expressed concern that regional fishery agencies could be placed in a difficult position if, through no fault of their own, data provided to FAO by other sources enabled the breaching of confidentiality of data provided by the regional fishery agencies to FAO. The Consultation further agreed that FAO should not disaggregate data provided by the agencies without their explicit approval, since such disaggregation could lead to breaches of confidentiality and possibly impair the relationship between industry, national statistical reporting offices and regional fishery agencies.

Verification of data

38. The Consultation agreed that verification of data supplied on high seas fisheries is essential both at the FAO level and at regional and national levels. Because of the large differences in the types of fisheries, however, it was thought of little practical value to recommend any particular verification procedure. Furthermore, different types of verification may be needed for the magnitude and distribution of catch and effort, for reports on discards and for species identification.

39. The Consultation further agreed that standard procedures of data verification should be developed and employed at both regional and national levels prior to input to a database. At the regional level, extensive use should be made of existing systems of inspection and observation.

40. A number of possiblities for verifying fisheries data were suggested for use in different situations. The possibilities include:

a) checking logbooks against landings data (e.g. sales notes);
b) sampling catch for species composition;
c) airborne and shipboard surveillance, associated with the boarding of vessels;
d) observer schemes;
e) comparison of landings statistics with certificates of origin, trade and production (e.g. processed fish) statistics and similar sources of information;
f) reporting from sea of retained catch on entering and leaving the high seas (or other administrative) zones;
g) the development and implementation of vessel monitoring systems utilising transponders to monitor the position, catch and other activities of vessels;
h) inspection of data collection methods by statistical staff; and
i) interviews with fishermen.

41. While it was accepted that the responsibility for collecting fishery statistics will reside with national authorities or regional fishery agencies, it was also thought to be desirable to maintain the independence of research and statistical agencies on the one hand, and enforcement agencies on the other. Although redundancy in data collection is generally to be avoided, it was thought appropriate to compare multiple sources of data where they exist.

Timeliness of the submission of data

42. The timely provision of data is necessary for assessing the status of fisheries resources and for determining the adoption of appropriate management measures. While noting the practical difficulties faced by national statistical reporting offices and regional fishery agencies in collecting and collating data in a timely manner, the Consultation nonetheless agreed that every effort should be made to ensure that the current data reporting requirements of regional fishery agencies and FAO are met. These requirements are that (i) nominal catch data should be compiled and submitted to regional fishery agencies and/or FAO with no more than a six-month time lag, and (ii) effort and associated catch data should be submitted with no more than a nine-month time lag.

43. For fisheries under management, it is desirable to have real time data. The importance and value of data transmission by radio, fax or transponders installed on fishing vessels was recognized by the Consultation.

44. The Consultation emphasized that the quality and timeliness of the submission of the data were essential for the rational management of high seas fisheries resources, and that in the absence of such data, proper management of these resources could not be assured.

Costs of collection, collation and dissemination of data

45. The Consultation agreed that every effort should be made to minimize the costs of collecting, collating and disseminating high seas catch and related data. It was noted that duplication in the collection and collation of data was costly. Information exchange arrangements between some regional fishery agencies already existed, but it was acknowledged that mechanisms for data sharing should be strengthened or established. Data processing, storage and retrieval costs may also be reduced for national statistical reporting offices and regional fishery agencies if they take full advantage of available information technology.

46. The Consultation recognized that in some cases developing coastal States lack the financial and technical resources to collect reliable fishery statistics. In such cases the international community is called on to assist those States financially and/or technically to develop the capability to collect such information.

47. The Consultation further recognized that in some cases states which provide flags of convenience (open registers) do not collect fishery statistics for their vessels. The Consultation urges such States to undertake programmes to collect and report data as outlined in this Report.

ADVICE ON THE HIGH SEAS FISHERIES STATISTICS TO BE COLLATED AND DISSEMINATED BY FAO

48. The Consultation reviewed the working paper relating to this agenda item (Doc.8; see Appendix V). The 1992 FAO Technical Consultation on High Seas Fishing had considered that FAO could coordinate the compilation of aggregated data on high seas fishing. In discussing the type of data which FAO could collate and the appropriate level of aggregation, the paper considered the user requirements, the need to avoid interruption of existing statistical time series and unnecessary duplication of data storage, confidentiality and costs. Such aggregated data would serve three main purposes: (i) it would provide a basis for describing fishing activity which takes place on the high seas, (ii) it would serve to describe global trends in high seas fisheries and (iii) indicate how effort might shift from one fishery to another in response to changes in inputs such as fishery restrictions. The Consultation recognized that assessment and management is primarily the function of national authorities and regional fishery agencies and that FAO would not normally be involved in these activities.

49. The Consultation recommended that regional fishery agencies should annually provide FAO with an inventory of the fishery statistics and biological data held by the agency relating

to straddling fish stocks and highly migratory fish stocks.

50. The Consultation agreed that catch and effort data should be provided to FAO on a stock basis, sub-divided into high seas and EEZ components, and where possible on a finer scale.

51. The regional fishery agencies concerned with tuna generally hold more reliable fishery statistics for the catch and effort of tuna vessels than are held at national level. These agencies may be able to provide FAO with catch and effort data by gear type and month for 5°x 5° rectangles, but not by flag for reasons of confidentiality. If data are to be provided separately for the high seas, it may be necessary to aggregate them across countries by gear type and also to introduce some spatial aggregation in order to avoid revealing the identity of individual vessels or companies. Because FAO will require data identified separately for the high seas, and because the most meaningful aggregation is to stock level, it was recommended that for tuna and tuna-like species, regional fishery agencies should provide FAO with nominal catch, discard and effort data by species, stock area, FAO major fishing area (this will in some cases be an approximation), inside/outside EEZ, gear type and year. The effort unit will be that considered most appropriate by the regional fishery agency. The stock area will correspond to that recognized by the agency and is specified in terms of 5°x 5° rectangles.

52. For other species, FAO could request corresponding catch and effort data for straddling stocks from regional fishery agencies where they exist. These data should be defined in terms of the agency's statistical divisions. Many areas are not covered by active regional agencies and so this will necessitate FAO requesting data directly from national sources.

53. In order to help FAO interpret trends and developments in the fisheries on highly migratory and straddling stocks, it was recommended that regional fishery agencies provide FAO with brief commentaries on the fisheries on an annual basis.

REPORTING OF HIGH SEAS FISHERY STATISTICS AND EXCHANGE OF DATA BETWEEN REGIONAL FISHERY AGENCIES AND FAO

54. The Chairman reviewed the working paper for this Agenda Item (Doc.9; see Appendix W). Some of the regional fishery agencies concerned with tuna collect their own data. For agencies which collate data from national sources, there is a case for harmonising reporting systems to reduce demands on national statistical reporting offices. Such harmonization requires cooperation among the agencies and the Consultation recognizes the efforts of the Coordinating Working Party on Atlantic Fishery Statistics (CWP) in this regard and recommends further development of these activities.

55. Concerning the exchange of data between regional fishery agencies and FAO, the Consultation recommended that FAO should consult with the agencies to develop a standard format for the reporting of catch and effort data as discussed in paragraphs 51-52. The existing format used by the CWP agencies for the exchange of STATLANT data may be modified to meet these requirements. It was also recommended that FAO in consultation with the agencies should develop a format for the reporting of the data inventory.

56. The Consultation agreed that national authorities and regional fishery agencies should provide FAO with the catch and effort data (paragraphs 51 and 52), the inventory (paragraph 49) and the commentary (paragraph 53) within 12 months of the end of the year for which data are being provided.

THE COORDINATING WORKING PARTY ON ATLANTIC FISHERY STATISTICS (CWP), AND ITS POSSIBLE EXTENSION TO AREAS OUTSIDE THE ATLANTIC OCEAN

57. The Consultation reviewed a working paper on this item (Doc.10; see Appendix X) and noted that the CWP is a forum for recommending standards and designing statistical collection systems which are subsequently also used outside the Atlantic area. It was also noted that the Second *Ad hoc* Consultation on Global Tuna Statistics had recommended that a similar coordinating body be established for agencies concerned with tuna, although such a body has not been realized. Given the global nature of many of the issues (e.g. high seas fishery statistics) which are discussed at CWP, the usefulness of extending its brief to a global level was recognized. Some concerns were expressed as to the number of participants which might attend global CWP meetings and the time and travel costs which would be incurred. It was noted, however, that these concerns could be met to some extent by using regional sub-groups to review specific regional issues.

58. The Consultation recommended that the CWP should extend its brief to a global scale. It noted that CWP will consider its future role and possible modification of its statutes at its Sixteenth Session in July 1994, and encouraged as many non-Atlantic agencies as possible to attend that meeting as observers.

EXCHANGE OF INFORMATION BETWEEN FAO AND REGIONAL FISHERY AGENCIES CONCERNING THE AUTHORIZATION OF VESSELS TO FISH ON THE HIGH SEAS

59. The Chairman introduced this Agenda Item based on the working paper before the Consultation (Doc.11; see Appendix Y). In so doing he outlined the purpose and intent of the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (the Flagging Agreement), which was approved by the Twenty-seventh Session of the FAO Conference in November 1993. The Consultation welcomed the Agreement and stressed the importance for all States whose vessels fish on the high seas to acceed to it.

60. With respect to the exchange of vessel information between regional fishery agencies and FAO, the Consultation acknowledged that FAO would provide agencies with a list of vessels authorized to fish on the high seas, subject to any restrictions imposed by contracting parties providing the information as provided for under the Flagging Agreement. Similarly, the Consultation agreed that regional fishery agencies should, where possible, provide FAO with a list of vessels operating within their respective convention areas. In this way both FAO and the regional fishery agencies would be in a position to compare vessel lists and detect discrepancies.

61. Concerning access to the FAO vessel database that would be maintained in connection with the Flagging Agreement, the Consultation endorsed the proposal to provide direct log-on access for authorized users from contracting party States and regional fishery agencies. However, the Consultation requested that the option to obtain vessel information in ASCII file format and through E-mail should also be available.

62. The Consultation further agreed that regional fishery agencies should exchange information among themselves concerning non-party vessels known to be fishing in the convention areas of other regional fishery agencies. The Consultation proposed that upon receipt of such information, follow-up action should be taken by the agency where non-party vessels were operating. This action should involve encouraging flag States whose vessels were operating in the convention area to acceed to that convention, where appropriate. Such action would enhance the conservation and management of high seas resources within the respective convention areas of the regional fishery agencies.

ANY OTHER MATTERS

63. Ambassador Nandan expressed his thanks to all participants for providing him with a new insight on the difficult tasks undertaken and the good work done by regional fishery agencies. He foresaw the role of regional fishery agencies becoming more important as more responsibilities are placed on them. He thanked Dr. Krone and FAO for organizing the Consultation. Finally, he thanked the Chairman, Dr. Joseph, for his excellent guidance of the meeting.

ADOPTION OF THE REPORT

64. Notwithstanding that most of the recommendations made by the Consultation relate to matters which will be considered by the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, the Consultation felt that many of the recommendations could be implemented under the present mandates of FAO and the regional fishery agencies. The Consultation recommended that FAO, regional fishery agencies and national authorities give serious consideration to implementing at the earliest possible time the recommendations concerning the provision and dissemination of statistics, both for current statistics and, where approriate, for historical statistics.

65. FAO should distribute copies of this Report to all relevant international organizations, regional fishery agencies and national authorities.

66. This Report was adopted on 16 December 1993.

APPENDIX A

TERMS OF REFERENCE

The following are the terms of reference as provided in the letter of invitation, sent by Dr. W. Krone, Assistant Director-General a.i., Fisheries Department, FAO, to participants of the *Ad hoc* Consultation on the Role of Regional Fishery Agencies in Relation to High Seas Fishery Statistics, dated 6 September 1993:

a) specify the requirements for statistics on high seas fisheries for research and management purposes (including any necessary data on fishing effort, catches of targeted species, incidental catches of other utilized species, and discards, and the appropriate level of aggregation by area and by gear), taking into account their purpose, usefulness, cost, burden in collection and collation, timeliness, confidentiality needs, as well as regional differences, and making particular reference to Annex 1 of the Negotiating Text prepared by the Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks;

b) specify the statistics on high seas fisheries which are routinely collated by various Regional Fishery Agencies;

c) advise on the high seas fisheries statistics (including the appropriate level of aggregation) which should be collated and disseminated by FAO, taking account of the confidentiality of the data, and indicate the financial implications;

d) propose arrangements for reporting of high seas fishery statistics (including formats and time frames) and, where appropriate, for the exchange of data between Regional Fishery Agencies and FAO;

e) propose arrangements for the exchange of information between FAO and Regional Fishery Agencies concerning the authorization of vessels to fish on the high seas and the activities of vessels fishing the high seas without authorization;

e) advise on the usefulness of extending the brief of the Coordinating Working Party on Atlantic Fishery Statistics (CWP) to areas outside the Atlantic Ocean.

APPENDIX B

AGENDA

1. Opening Statement by FAO

2. Adoption of Agenda and Working Arrangements

3. Appointment of Chairman

4. Review of the statistics reported on high seas fisheries which are presently collated by regional fishery agencies

5. Specification of the requirements for statistics on high seas fisheries for research and management purposes

6. Logistical and financial implications associated with data collection

7. Advice on the high seas fisheries statistics (including the appropriate level of aggregation) to be collated and disseminated by FAO, taking into account the confidentiality of the data and the financial implications

8. Proposals for arrangements for reporting of high seas fishery statistics (including formats and time frames) and, where appropriate, for the exchange of data between regional fishery agencies and FAO

9. The Coordinating Working Party on Atlantic Fishery Statistics (CWP), and its possible extension to areas outside the Atlantic Ocean

10. Proposals for arrangements for the exchange of information between FAO and regional fishery agencies concerning the authorization of vessels to fish on the high seas and the activities of vessels fishing the high seas without authorization

11. Any other matters

12. Adoption of the Report

APPENDIX C

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APPENDIX D

LIST OF DOCUMENTS

1. Opening Statement by FAO

2. Provisional Annotated Agenda

3. Provisional List of Working Documents

4. Provisional List of Participants

5. Introductory paper for Agenda Item 4: Review of the Statistics Reported on High Seas Fisheries which are presently collated by regional fishery agencies

5.A	**CCAMLR**	Commission for the Conservation of Antarctic Marine Living Resources
5.C	**FFA**	South Pacific Forum Fisheries Agency
5.D	**I-ATTC**	Inter-American Tropical Tuna Commission
5.E	**ICCAT**	International Commission for the Conservation of Atlantic Tunas
5.F	**ICES**	International Council for the Exploration of the Sea
5.G	**IPTP**	Tuna Management in the Indian and Pacific Oceans (Phase IV)
5.H	**NAFO**	Northwest Atlantic Fisheries Organization
5.I	**SPC**	South Pacific Commission
5.J	**NPAFC**	North Pacific Anadromous Fish Commission (formerly INPFC)
5.K	**FAO**	FAO Regional Bodies (CECAF, GFCM)

6. Introductory paper for Agenda Item 5: Specification of the requirements for statistics on high seas fisheries for research and management purposes

7. Introductory paper for Agenda Item 6: Logistical and financial implications

8. High Seas Fishery Statistics to be Collated and Disseminated by FAO

9. Introductory paper for Agenda Item 8: Reporting and Exchange of High Seas Fishery Statistics

10. Role of the Coordinating Working Party on Atlantic Fishery Statistics (CWP)

11. Provision by FAO of Information on the Authorization of Vessels to Fish on the High Seas

APPENDIX E

OPENING STATEMENT BY DR. W. KRONE, ASSISTANT DIRECTOR-GENERAL, A.I. FISHERIES DEPARTMENT, FAO

I would like to welcome all of you to the *Ad Hoc* Consultation on the Role of Regional Fishery Agencies in Relation to High Seas Fishery Statistics. The *Ad hoc* Consultation is honoured by the presence of the Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, His Excellency Mr. Satya Nandan. The Negotiating Text, which Ambassador Nandan prepared for the United Nations Conference, directly addresses the need for reliable fishery statistics for high seas areas. I particularly wish to welcome Ambassador Nandan and thank him for making the time available to participate.

I am extremely grateful to the Inter-American Tropical Tuna Commission for agreeing to host this meeting. It is entirely appropriate that a meeting concerned with high seas fishery statistics and the role of regional agencies should take place in La Jolla, the home of IATTC. This Commission has a long and distinguished history of data collection, research and management in the high seas and coastal areas of the eastern Pacific. Its recent history has been shaped by its distinguished Director, Dr. James Joseph, who has also contributed to countless activities outside IATTC, including FAO meetings. Early this year he skilfully chaired a meeting of a group of experts convened by FAO which drew up the first draft of what later became the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. A measure of the excellent work done by that group is that the Agreement was adopted within nine months, by the unanimous consensus of the FAO Conference.

Since the UN Convention on the Law of the Sea was adopted and opened for signature in 1982, most coastal States have declared jurisdiction over waters up to 200 nautical miles from their coastlines in terms of exclusive economic zones (EEZ) or extended fishing zones. This has had the effect of bringing most of the exploited living marine resources to which there was open access, under the exclusive management authority of individual coastal States and so provided the basis upon which more effective management could be built. However, improved management has not been realised in many cases for a variety of reasons, one of which is that for stocks which straddle the EEZ and high seas zones, fishing in the high seas part of the stock's range may be unrestrained. Because the problem of open access remains for the high seas areas beyond the EEZs, this has real or potentially serious implications for the conservation of straddling fish stocks, highly migratory fish stocks and high seas stocks. Despite the constraints exercised by some regional fishery agencies on the activity of vessels from contracting party States, vessels from non-contracting party States are not bound by such measures and may therefore be unrestrained. The problem is compounded by the fact that some of the fishing effort which was excluded from coastal waters by the extension of national jurisdictions has been diverted to high seas waters.

The regional fishery agencies will be very familiar with this problem. It relates to almost all of the highly migratory tuna and tuna-like species, and oceanic sharks. The total catches (from EEZs and adjacent high seas) reported to FAO of the highly migratory species listed in the 1982 Convention have developed from 1.7 million metric tons (mt) in 1970 to 4.3 million mt in 1991. These species currently account for 5 percent of the total marine fish catch in terms of weight, but far more in terms of value. In 1991, the three top tuna species in terms of total revenue, yellowfin, bigeye and skipjack, accounted for an estimated US$ 6.7 thousand million corresponding to 2.8 million mt, 66 percent of which was taken in the Pacific, 16 percent in the Atlantic and the remainder in the Indian Ocean.

FAO has made very crude estimates of the total catches (from EEZs and adjacent high seas) of straddling stocks and these indicate an increase from 5.8 million mt in 1970 to 12.3 million mt in 1991, following a peak of 13.7 million mt in 1988-89. The 1991 figure, which represents about 15 percent of the total marine catch, comprises about 1 million mt of tuna and tuna-like species (highly migratory species excluded) and over 11 million mt of other fish and squids. Alaska pollock in the Bering Sea is an important straddling stock for which up to 30 percent of the annual catch of about 6.6 million mt in the late 1980s came from the Donut Hole high seas area. Other important straddling stocks include Chilean jack mackerel in the Southeast Pacific, Argentine hake and Argentine shortfin squid in the Southwest Atlantic, Atlantic cod in the Northwest Atlantic, blue whiting in the Northeast Atlantic, flying squid in the Northwest Pacific, Southern blue whiting in the Southwest Atlantic and orange roughy in the Southwest Pacific.

The 1992 International Conference on Responsible Fishing agreed the Declaration of Cancún which recognised that high seas fisheries have expanded, that the management of high seas fisheries is inadequate in many areas and that in some areas resources are overutilized. The same document declared that "States should promote and enhance collection of data necessary for the conservation and sustainable utilization of fisheries resources".

The 1992 United Nations Conference on Environment and Development (UNCED) specified the problems of lack of monitoring and control of high seas fisheries in more detail, identifying unreliable databases as one element. It called for action and cooperation to address inadequacies in biological knowledge and fisheries statistics and for the improvement of systems for handling data. UNCED further called upon States to cooperate, with the support of appropriate international organizations, to promote enhanced collection of data necessary for the conservation and sustainable use of the marine living resources of the high seas, to exchange data and information adequate for fisheries assessment, and to develop databases on the high seas marine living resources and fisheries.

The 1992 Technical Consultation on High Seas Fishing convened by FAO considered the requirements for high seas fishery statistics in more detail. The Consultation considered that basic data requirements for catch and effort were essential for both research and management. Concerning the requirements for the assessments of high seas stocks, it recognised that the scientific committees of international relevant regional agencies, where they exist, were the most appropriate agencies for identifying the types of data required. Where such agencies do not exist, it suggested that FAO might take a lead to determine data requirements in consultation with States fishing in the region. Importantly, in relation to data quality, the Technical Consultation recognized as essential the cooperation of fishing skippers to record such information and that the data should be verified as far as possible.

The UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks convened its second session in July 1993 to discuss substantive issues. The Conference will reconvene for its third session in March 1994, and for a final session in August 1994. It is important to note that the intention in holding this *Ad hoc* Consultation is not in any way to preempt the discussions which will take place at the Conference, but rather to support them through the elaboration of issues relating to high seas statistical requirements.

In the Negotiating Text prepared by the Chairman of the UN Conference, responsibilities of flag States and of regional agencies in relation to data collection, compilation and dissemination are defined. Annex 1 to the Negotiating Text provides an important specification of minimum data requirements for the conservation and management of straddling fish stocks and highly migratory fish stocks. It contains a description of general principles to be considered, the basic requirements for fishery, scientific and vessel data, and procedures for data reporting, validation and exchange.

Although it is concerned with data for straddling fish stocks and highly migratory fish stocks which are not restricted to high seas areas, some of its provisions relate only to the high seas.

It is clear, therefore, that the UN Conference in its consideration of data requirements is responding to the outcomes of UNCED and the FAO Technical Consultation on High Seas Fishing by specifying clearly the responsibilities of States, regional arrangements, and regional fisheries management agencies, and by specifying in considerable detail the minimum data requirements.

Another area where there has been considerable progress in tackling the high seas problem is the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas which was approved by the Twenty-seventh Session of the FAO Conference in November 1993. It will enter into force after 25 acceptances and it is hoped that this will be achieved in a relatively short time. The Agreement will form an integral part of the International Code of Conduct for Responsible Fishering which was called for in the Declaration of Cancún. The aim of this Agreement is to deter the flagging of vessels as a means of avoiding compliance with conservation and management rules for fishing activities on the high seas and to encourage flag States to fulfil their responsibilities with respect to fishing vessels entitled to fly their flags and operating on the high seas.

The means employed to achieve this objective include specifying flag States' responsibility in respect of fishing vessels operating on the high seas, including the authorization by the flag State of such operations, as well as through strengthened international cooperation and increased transparency through the exchange of information on high seas fishing. The objective concerning the flow of information will be met by flag States maintaining a record of vessels authorized to fish on the high seas and providing this information to FAO on a real-time basis. FAO will then make the information available to contracting parties and to regional fisheries organizations. Flag States will also be required to report promptly to FAO information concerning the activities of their vessels that undermine the effectiveness of international conservation and management measures. In addition each party, where it has reasonable grounds to believe that a fishing vessel flying another country's flag has engaged in activity that undermines such measures, shall draw this to the attention of the flag State and may draw it to the attention of FAO. FAO will circulate all of this information promptly to all parties and, subject to any distribution restrictions imposed by the party concerned, on request to regional fisheries organizations. Flag States are obliged to take enforcement measures in respect of their fishing vessels which contravene the provisions of the Agreement, and for serious cases this shall include the suspension or withdrawal of the authorization to fish on the high seas.

Fisheries management for some parts of the world's oceans is the responsibility of FAO regional fishery bodies and the FAO Council at its 102nd Session agreed that these bodies are appropriate for the management of high seas fisheries and that they should be strengthened and better coordinated. The need for improved collection, analysis and dissemination of statistics and scientific information was stressed, particularly with respect to straddling stocks.

Changes are taking place in these bodies. The Indo-Pacific Fishery Commission, which was established in 1948, was last week reviewing its articles relating to functions and responsibilities. The General Fisheries Council for the Mediterranean (GFCM), established in 1949, this year undertook to change its structure in order to address the problems of high seas fishing. The GFCM has responsibility for a large high seas area because national fishery jurisdictions have not been declared in the Mediterranean. The Fishery Committee for the Eastern Central Atlantic has recently been strengthened by the Ministerial Conference of African States Bordering the Atlantic Ocean, whereby adjacent coastal States have formalized cooperation in the management of fisheries within their jurisdiction. For the Western Central Atlantic Fishery Commission, the Lesser Antilles

Committee on Fisheries has been active in harmonizing legislation for fisheries and the management of fisheries within their jurisdiction. At the 27th Session of the FAO Conference in November 1993, the establishment of the Indian Ocean Tuna Commission as an autonomous intergovernmental body was adopted.

It is clear that all of the developments in relation to the exchange of data and information will bring an increased need for coordination among regional fisheries agencies. The Coordinating Working Party on Atlantic Fishery Statistics (CWP) coordinates the activities of the various regional agencies concerned with the collection of fishery statistics for the Atlantic Ocean. It was responsible for establishing principles and definitions and designing the reporting systems which also shaped the statistical collection systems in FAO. No such coordinating body exists for agencies in other regions. At its next meeting in July 1994, the CWP will consider its future role and the possible modification of its terms of reference so as to extend its brief to other oceans. It would be very useful to obtain the views of as many regional agencies as possible in relation to the need for a coordinating mechanism for other oceans and, if so, whether a possible extended geographical role for the CWP would be the appropriate arrangement.

With all of these developments taking place, the convening of this *Ad hoc* Consultation is very timely. It is also a very rare occasion to hold a meeting of all the regional fishery agencies. Although the IATTC, the International Commission for the Conservation of Atlantic Tuna and the South Pacific Forum Fisheries Agency regularly attend the FAO Committee on Fisheries, and their interventions are greatly welcomed by the secretariat, a meeting of experts from all the regional fishery agencies has not occurred since 1976, when an informal meeting of the staff of regional fishery agencies was held in Lisbon in conjunction with the Fourth Session of the FAO Committee of Fisheries' Sub-Committee on the Development of Cooperation with International Organizations Concerned with Fisheries. Dr. James Joseph was a participant in that meeting also.

It is clear that the regional fishery agencies and FAO face some considerable challenges, but there is now a real opportunity to improve the information available on high seas fishing which is essential for research, management and policy making. Your deliberations at this *Ad hoc* Consultation will be very important in determining how this opportunity can be realised. You have demanding terms of reference and a very full agenda which addresses a wide variety of topics in relation to high seas fishery statistics. I wish you well in your work over the next four days.

APPENDIX F

REVIEW OF THE STATISTICS REPORTED ON HIGH SEAS FISHERIES WHICH ARE PRESENTLY COLLATED BY REGIONAL FISHERY AGENCIES

Introduction

1. The *Ad-hoc* Consultation will review the statistics for high seas fisheries collected (i.e. directly from vessels) and collated (i.e. from national sources) by each agency in terms of their data content, the composition and level of aggregation of the data collated (e.g. whether the catch and effort data are aggregated by rectangles or held on a haul-by-haul basis), whether there are value data, the approximate number of vessels for which data are available and the quantities of data stored. Details in relation to this item will be available in working documents from the agencies.

2. With this information, it should be possible to make for the first time a global description of the high seas fishery data being made available to regional fishery agencies.

3. Such a description will serve as a basis for:

(i) identifying the regions for which high seas fishery statistics are adequately reported;

(ii) identifying the regions for which high seas fishery statistics are inadequately reported or not reported at all;

(iii) identifying the level of detail of information which regional fishery agencies can realistically expect to obtain (a) directly from vessels, and (b) from national authorities;

(iv) indicating the reliability of high seas fishery statistics obtained (a) directly from vessels, and (b) from national authorities;

(v) identifying the cost of running data collection, collation, processing and dissemination activities in relation to high seas fishery statistics;

(vi) identifying whether the data currently collected or collated by regional fisheries agencies adequately meet the needs for research, management and policy making (Agenda item 5);

(vii) advising on the high seas fishery statistics which should be collated by FAO, particularly for areas for which there is no regional fisheries agency (Agenda Item 7); and

(viii) considering whether there is a need for developing common standards and practices for the collection and collation of high seas fishery statistics (Agenda Item 8) and for some mechanism for coordinating the statistical activities among regional fishery agencies (Agenda Item 9).

Action Required

4. On the basis of the review of regional fishery agency programmes for high seas fishery statistics, the *Ad hoc* Consultation is invited to consider item 3 (i)-(v) above.

APPENDIX G

COMMISSION FOR THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES

High Seas in the CCAMLR Convention Area

In accordance with the definition of high seas by the Law of the Sea Convention (Article 86), the area of application of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) almost entirely comes under the category of high seas. The map of the CCAMLR Convention Area and Statistical Areas is given in Figure 1.

Fishery Statistics Requirements

All present fisheries in the Convention Area are subject to conservation measures. For the 1993/94 season, CCAMLR has set conservation measures to regulate fisheries of icefish (*Champsocephalus gunnari*), Patagonian toothfish (*Dissostichus eleginoides*), grey rockcod (*Notothenia squamifrons*), myctophids (*Electrona carlsbergi*), Antarctic krill (*Euphausia superba*) and crabs (suborder Reptania). These conservation measures establish Total Allowable Catches, Precautionary Catch Limitations, fishing seasons and other fisheries regulations. CCAMLR does not operate a catch quota system.

In its treatment of statistics, CCAMLR makes no distinction between high seas and other areas in the Convention Area.

Fishery statistics are currently used by CCAMLR for the following purposes:

(i) stock assessments for establishing management measures for target and by-catch species;

(ii) operational management of fisheries: closures of fisheries on completion of TACs and other catch limitations are determined by the CCAMLR Secretariat; enforcing of management measures through the CCAMLR Inspection System;

(iii) assessment of incidental mortality of marine mammals and birds during fishing operations for establishing measures to prevent such mortality; and

(iv) calculation of annual financial contributions of CCAMLR Members, a specific part of which is weighted by the catch of different categories of resources by individual Members.

In addition, monitoring of krill availability to various predators, as part of the CCAMLR Ecosystem Monitoring Program (CEMP), also requires statistics from krill fisheries. At present, CCAMLR is working on a strategy for incorporating CEMP data in fisheries management.

Currently Collected Data

CCAMLR Members are required to submit data on the catches and biological statistics of commercially exploited fish stocks in the Convention Area. CCAMLR reporting requirements are the subject of several conservation measures and other decisions of the CCAMLR Commission.

At its 1993 meeting, CCAMLR agreed with the following requirements for providing fisheries statistics in the case of joint venture operations:

- in the case of joint ventures where all parties are Members of CCAMLR, responsibility for reporting data to CCAMLR should rest with the flag state of the vessel(s) concerned; and

- in the case of joint ventures where one part is not a Member of CCAMLR, the party which is a Member of CCAMLR would be expected to assume responsibility for reporting data and ensuring compliance with Conservation Measures.

In relation to straddling stocks, which occur both within the area of the Convention and within adjacent areas, CCAMLR reaffirmed that Members should ensure that their flag vessels conduct harvesting of such stocks in areas adjacent to the Convention Area responsibly and with due respect for the Conservation Measures it has adopted under the Convention (Resolution 10/XII).

The data collected is held in the CCAMLR Data Centre maintained by the Secretariat in Hobart, Tasmania. Data is collated by the Secretariat using Powerhouse, a relational database on a VAX mini-computer.

The following fishery statistics are currently held at the Data Centre:

(i) STATLANT 08A and 08B data from all fisheries in all areas

(ii) fine-scale catch and effort data (resolution: spatial = 1° Longitude by 1/2° Latitude, temporal = 10 days) for all fisheries

(iii) very fine-scale catch and effort data (10 n. miles x 10 n. miles approximately) for krill in some areas

(iv) haul-by-haul data from certain fisheries in some areas (longline fisheries for Patagonian toothfish; trawl fisheries for krill where available)

(v) biological sampling data from all fisheries: length composition, age composition, maturity composition.

In addition to fisheries-based statistics, CCAMLR maintains databases of the results of fisheries research surveys, and various indicators of penguin and seal reproductive performance derived from the CCAMLR Ecosystem Monitoring Program. This latter program is a product of CCAMLR's responsibility to manage fisheries in the Antarctic taking into consideration effects on dependent and related species.

CCAMLR in recent years has found it necessary to request fisheries information on increasingly finer scales for effective scientific assessment. The total number of databases currently maintained is 20, of which 7 are fisheries related, containing a total of almost 25 000 records. The annual increase is about 6 000 records (between 150 and 200 kB per year), and about 95% of these data are fisheries related.

Data Access

CCAMLR has adopted a set of rules regulating the access and use of data held in the CCAMLR Data Centre (appended).

Data are usually supplied by the Secretariat in ASCII file format as a simple listing of all records of a particular database of interest to the Member. However, in specific circumstances more complex hard copy extractions may be supplied on request.

The Secretariat produces a yearly publication, the *CCAMLR Statistical Bulletin*. The latest edition is Volume 5 covering the years 1983 to 1992. Next edition of the Bulletin will be published in March 1994.

Costs

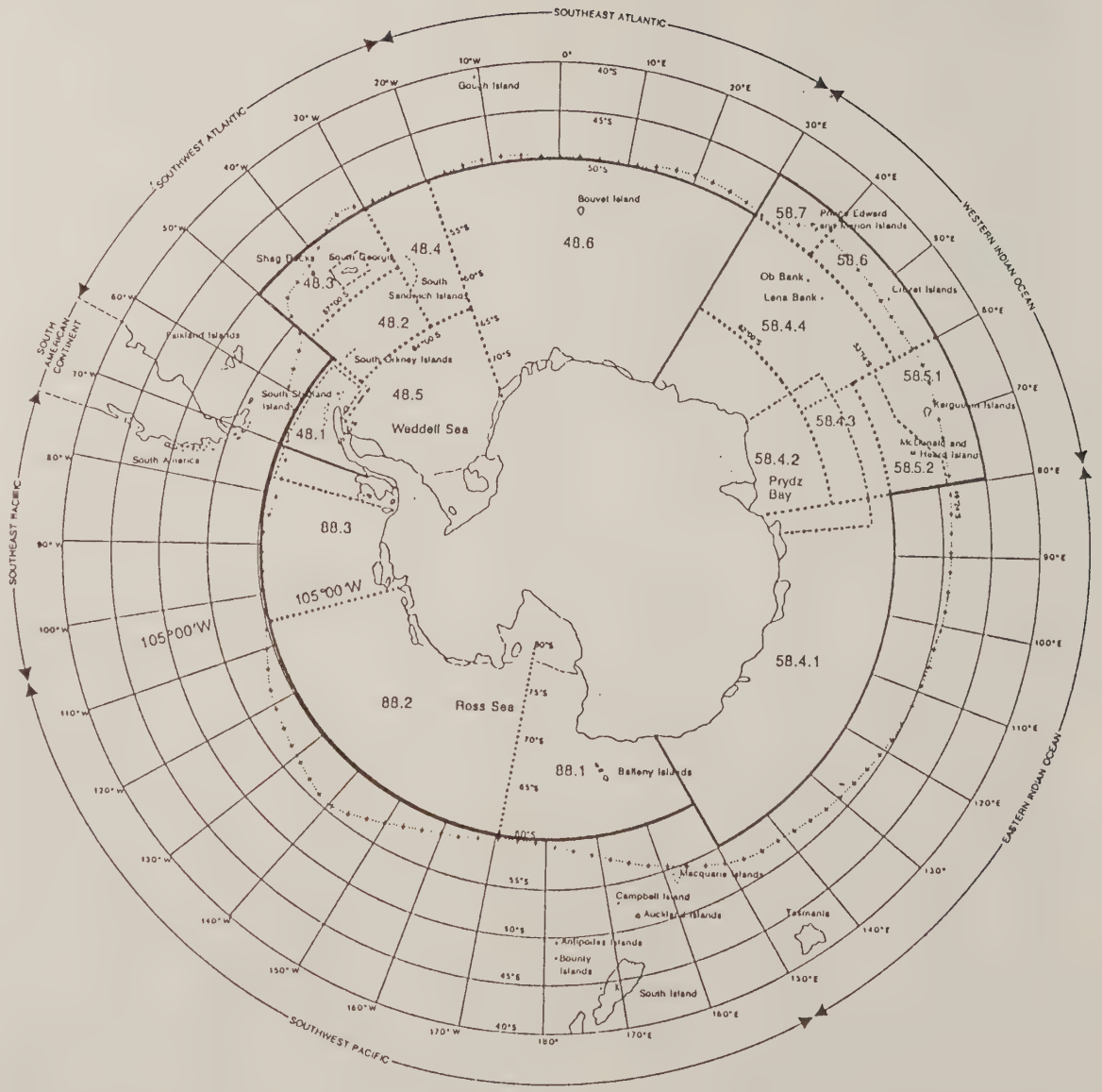
It is difficult to separate the costs of managing high seas fisheries from costs of other tasks undertaken by the CCAMLR Data Centre because of the interlocking nature of most of these tasks. However, probably just under half of the work of the CCAMLR Data Centre may be attributed to fishery related work, of which most (>98%) can be considered to be work on high seas fisheries statistics. This cost, about US$30 000 would include part costs for the CCAMLR Data Manager, a Computer systems manager, hardware and software purchases and communication.

CCAMLR fisheries statistics are disseminated in the annual publications *CCAMLR Statistical Bulletin*. This costs US$1 500 to prepare.

To summarize, the annual workload for fisheries statistics at CCAMLR involves entry, processing and dissemination of about 5 700 records (between 150 and 200 kB) at an approximate cost of US$31 500.

CCAMLR

Boundaries of the Statistical Reporting Areas in the Southern Ocean



LEGEND
- STATISTICAL AREA
  ZONE STATISTIQUE
  СТАТИСТИЧЕСКИЙ РАЙОН
  AREA ESTADISTICA
- STATISTICAL SUBAREA
  SOUS-ZONE STATISTIQUE
  СТАТИСТИЧЕСКИЙ ПОДРАЙОН
  SUBAREA ESTADISTICA
- ANTARCTIC CONVERGENCE
  CONVERGENCE ANTARCTIQUE
  АНТАРКТИЧЕСКАЯ КОНВЕРГЕНЦИЯ
  CONVERGENCIA ANTARTICA
- CONTINENT, ISLAND
  CONTINENT, ILE
  МАТЕРИК, ОСТРОВ
  CONTINENTE, ISLA
- INTEGRATED STUDY REGION
  ZONE D'ETUDE INTEGRÉE
  РАЙОН КОМПЛЕКСНЫХ ИССЛЕДОВАНИЙ
  REGION DE ESTUDIO INTEGRADO

Fig.1 CONVENTION AREA

Annex

Rules of Access to Data Held in the CCAMLR Data Centre

The following access rules are applied to data held in the CCAMLR Data Centre:

(a) All data submitted to the CCAMLR Data Centre should be freely available to Members for analysis and preparation of papers for use within the Commission, the Scientific Committee and their subsidiary bodies.

(b) The originators/owners of the data should retain control over any use of their unpublished data outside of CCAMLR.

(c) Requests to the Secretariat by individual scientists of a Member for access to data in the CCAMLR Data Centre will only be considered if the request has been approved in writing by the Representative to the Scientific Committee (or his nominated deputy) of that Member. The Representative is responsible for informing the individual scientist requesting the data, of the roles governing access to CCAMLR data and for obtaining the requester's agreement to comply with these rules.

(d) When Members request access to data for the purpose of undertaking analyses or preparing papers to be considered by future meetings of CCAMLR bodies, they should indicate the reason for the request and the nature of envisaged data analysis. The Secretariat should supply the data and inform the originators/owners of the data of this action, together with the details of the original request. When data are requested for purposes other than consideration by future meetings of CCAMLR bodies, the Secretariat will, in response to a detailed request, supply the data only after permission has been given by the originators/owners of the data.

(e) Data contained in papers prepared for meetings of the Commission, the Scientific Committee, and their subsidiary bodies should not be cited or used in the preparation of papers to be published outside of CCAMLR without the permission of the originators/owners of the data. Furthermore, because inclusion of papers in the *CCAMLR Science Journal* or any other of the Commission's or Scientific Committee's publications, constitutes formal publication, written permission to publish papers prepared for meetings of the Commission, Scientific Committee and Working Groups should be obtained from the originators/owners of the data and authors of papers.

(f) The following statements should be placed on the cover page of all unpublished working papers and background documents tabled:

> "This paper is presented for consideration by CCAMLR and may contain unpublished data, analyses and/or conclusions subject to change. Data contained in this paper should not be cited or used for purposes other than the work of the Commission, the Scientific Committee or their subsidiary bodies without the permission of the originators/owners of the data".

APPENDIX H

SOUTH PACIFIC FORUM FISHERIES AGENCY

Introduction

The western tropical Pacific region which encompasses the area served by the South Pacific Forum Fisheries Agency (FFA) covers an area of approximately 24.8 million km^2. Of the 16 member countries of FFA, 14 are small island states[1/]. These Pacific island countries have a combined land area of 0.527 million km^2. The combined area of the island states' exclusive economic zones (EEZs) is around 20.1 million km^2, or 81 per cent of the total; the remaining 19 per cent therefore comprises high seas.

Nearly all of the island countries in the region rely heavily upon fisheries for their economic development, with tuna constituting the single most important renewable resource. For the small island countries such as Marshall Islands, Kiribati and Tuvalu, development of their offshore tuna resources represents the greatest opportunity for substantial economic development. Annex 1 indicates the EEZs and high seas areas of the FFA region, especially in relation to the Pacific island member states.

Recent total tuna catches taken in the region are estimated at 1.1 million tonnes annually, with a landed value of around USD1.2 billion. Only a small proportion of the catch (6 per cent) is taken by locally-based vessels; the majority of the catch (94 per cent) is taken by foreign fishing vessels (FFVs) of the distant water fishing nations (DWFNs), the most important in terms of catches taken being Japan, USA, Korea, and Taiwan. Under-reporting and non-reporting of catches within the EEZs of the island nations is estimated to be at least 180,000 tonnes per year; the amount taken illegally through poaching (fishing without a licence) is not known, but is certainly considerable.

FFA was established in 1979 following a directive by the South Pacific Forum in response to a need for increased regional cooperation in fisheries. Changes to the management, use and ownership of the ocean's resources proposed by the Third United Nations Law of the Sea Conference and, in particular, the introduction of 200 nautical mile EEZs, necessitated the establishment of a regional agency to deal with fisheries matters, particularly tuna resources.

The Convention reflects the common interest of its sixteen member states in deriving maximum economic and social benefit from their marine resources, including migratory species within their EEZs and in the high seas of the region. The Mission Statement of FFA is:

> *To improve the economic and social well-being of member countries by promoting the sustainable development and management of their fisheries resources.*

A total of 29 professional and 21 support staff are currently employed at FFA. The Agency functions as a consultative and advisory body and takes its direction from the Forum Fisheries Committee (FFC), comprising representatives of all FFA member states. FFC meets at least once a year to approve a budget and work programme. FFC's decisions are subsequently reviewed by

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1/ The 16 member states of FFA are: Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa.

the South Pacific Forum.

One of the most significant regional developments since the establishment of FFA has been the emergence of the sub-regional group known as the Parties to the Nauru Agreement (PNA), and the influence of this group on regional fisheries policy. The significance of PNA, which comprises Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu is largely due to the fact that, between them, the members exercise jurisdiction over a very large proportion of the tuna resources of the central and western Pacific. The basic objective of PNA, as expressed in the Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest, is to seek to establish a coordinated approach to the fishing of common stocks in the fisheries zones by foreign fishing vessels. This is to be achieved by, *inter alia*, the mechanism of minimum terms and conditions of access. FFA serves as the secretariat to PNA.

In response to a concern over the rapid increase in purse-seine activity in the central and western Pacific, PNA have developed a mechanism to manage the purse seine fishery on a regional basis. In 1992, the parties concluded the Arrangement for the Management of the Western Pacific Purse Seine Fishery (the Palau Arrangement) which applies to the zones of the parties and the adjacent high seas.

Under the Arrangement, a cap is placed on the total number of purse seiners which may be licensed to operate in the EEZs of the countries involved.

Requirements for Fishery Statistics (including High Seas)

FFA undertakes the collection, analysis, evaluation and dissemination of technological and economic information on living marine resources of the region to its member states, especially in regard to tuna. Data on commercial tuna activities is required to:

- Conduct studies on the value to the distant water fishing nations of access to member countries EEZs;

- Provide briefings on the means by which results of studies can be effectively used in access negotiations;

- Improve negotiating strengths through regional harmonisation and assistance in development of multilateral arrangements;

- Conduct economic evaluations of existing domestic fishing ventures and appraisal of new activities and joint ventures;

- Develop a database on the operational costs and earnings of DWFN vessels;

- Undertake statistical analyses of logsheet catch, effort and operational data;

- Maintain a database on access fees received by member states.

These activities are undertaken for the benefit of the member states, and form part of the Agency's work programme, as directed by FFC. The need to gain access to high seas data is particularly important to the region for analysis of relative economic benefit to DWFNs derived through access to the EEZs of member states under either bilateral or multilateral access

arrangements as compared with activities conducted on the high seas.

Data Currently Collected, Processed and Stored

In pursuit of the activities outlined above, FFA operates three major databases which comprise the Fisheries Management Information System (FMIS). These databases contain a variety of data types, obtained from various sources, concerning tuna fishing vessels operating in the region.

1. Regional Register database

The Regional Register of foreign fishing vessels is the primary database which deals with the registration of vessels in the region and is regarded as being the superset of the three systems with regard to tuna fishing vessels. The Register is a mechanism through which FFA member states control the activities of FFVs by applying the concept of "good standing", which is accorded to every FFV registered. If good standing is withdrawn or suspended, the vessel concerned may be "black-listed" and disqualified from fishing in all FFA member country zones. The Register was established in 1983, and the threat of black-listing has in several instances been sufficient to prompt owners to make out of court settlements for known infringements.

FFA's surveillance personnel are advised by fax or telex of provisional and final registrations directly from vessel owners. A Data Control Officer then enters the data into the database. The type of data requested is indicated on the application form given as Annex 2. There are 903 vessels with good standing recorded in the database for the current registration period. Thirty users are currently registered to access this vessel information. The database requires minimal technical support from Information Technology Division staff. A summary of the vessel records currently entered on the Register by vessel type and flag state is given as Annex 3.

FFA has recently upgraded this database design to provide additional vessel information based on changing technologies, improved registration history and as a result vessel information can now be analysed across a variety of parameters eg. flag, vessel size, gear type, etc. The architecture of the information systems at FFA is moving towards the client/server model and the Regional Register was the prototype system to be developed using this model. The application resides on the user's PC and is developed using MS-ACCESS software. The data resides on the HP 9000 minicomputer in the corporate ORACLE database.

The result is a more user-friendly, accurate mechanism for storing and analysing vessel attributes and registration history. This software is being made available to FFA member states including an improved data transfer mechanism.

Future developments of the system will include a Vessel Monitoring System which will facilitate near real-time information on vessel operations through a satellite transponder placed on each vessel. The first emphasis will be on position reporting, and from mid-late 1995 onwards, catch data being transmitted in near to real time will be addressed. This project will permit a radical change to the underlying databases regarding vessel identification. It will also change the political and logistic procedures currently in place regarding the flow of data and how FMIS databases are organised, updated and accessed by users.

2. Regional Tuna Fisheries Logsheet Database

The Logsheet data holdings take up approximately 1.8 Gb of disc space on the HP9000 and

comprises tuna catch and effort information cross-referenced to vessel identifiers, but not integrated with the Regional Register as yet. Data entry is made from hard copy logsheets entered into the Regional Tuna Database maintained by the South Pacific Commission (SPC) in Noumea, New Caledonia. SPC receives the logsheets from member states on a regular basis from either domestic fleets or DWFNs fishing under access arrangements. This data covers all tuna fleets operating in the region using purse-seine, pole-and-line, longline and troll gear types.

The level of resolution of this data, by gear type and fleet, is described in the SPC paper presented at this consultation.

FFA receives an update of the regional tuna fishery database every 3 months. The hard copy logsheets are at least 6 months old by the time they are entered into the SPC system and it is extremely difficult to enforce data validation requirements. Discussions with SPC with regard to using the new Regional Register vessel identifiers to provide an effective linkage between the Regional Register and Regional Tuna Database are on-going.

Prior to 1991, high seas data had not been requested as a condition of access for longline, pole-and-line and most purse-seine fleets, and was therefore not supplied to member states on logsheets returns. The current extent of high seas data coverage is therefore low. However, this situation is now improving. FFA member states have included the submission of high seas data as one of the revised Minimum Terms and Conditions (MTCs) of access to the region, which was endorsed by the South Pacific Forum in 1990. Under the terms of the multilateral Treaty on Fisheries which came into effect in 1988, the US purse-seine fleet submits logsheets detailing all fishing activities, including those conducted on high seas, to FFA as the Administrator of the Treaty. In response to the agreement by the US to release aggregated data on their regional fishing activities to Japan, Japan has agreed to reciprocate. However, at this time, it is unclear whether the FFA Secretariat will get access to the Japanese high seas data. Taiwan also now supplies high seas data under the revised regionally accepted MTCs, but data quality remains a problem.

3. US Treaty Catch database

The Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States became effective on June 15 1988. Under the initial 5 year licensing period, 50 vessel licences were available. An extension of the Treaty commenced on 15th June 1993 for a period of 10 years, under which 55 licences are available. At present, 40 vessels are operating under the Treaty. A review of the Treaty will be conducted at the end of the first 5 years. The present Treaty provides USD18 million annually for 10 years to the Pacific Island parties as licence fees.

Vessels operating under the Treaty provide logsheets or Catch Report Forms (CRFs) which detail the catch by species and daily position of set information. These are forwarded via the US National Marine Fisheries Service (NMFS) to FFA's Multilateral Treaty Manager within 14 days of the completion of a trip. This is input to the Multilateral Fisheries Treaty Information System database on the HP9000 minicomputer. This database is a customised database written in FoxPro. The primary use of the CRF data is for determining the distribution of fees; 85 per cent of which is distributed solely on catch distribution. During a fishing trip, weekly position and catch reports are forwarded by the purse-seiner directly to FFA by telex. These reports detail the total amount by species (skipjack, yellowfin and bigeye) on board to date.

A further source of data comes from ship board observers, who provide end of trip reports which verify catch and effort data reported on the vessel's CRF, and also contains tuna length frequency data by species for each set made. A total of 58 vessel observers, all Pacific Island nationals, are currently employed on a rotational basis by FFA. The aim is to achieve a 20 per cent coverage rate of the US Treaty fleet. Port samplers, employed by NMFS, also collect length frequency information as the pursers unload, and provide additional information on size distribution of the catch, by port of unloading. Port sampling data is collated by NMFS, who in turn post it to FFA on a quarterly basis.

FFA intends to also employ additional observers to expand the observation programme to all fleets. In addition, SPC and some FFA member countries are expanding their observer programmes so that in future the verification and monitoring of FFV activity will improve.

The data provided under the Treaty is used for administration of funds and also for economic analyses. The data remains the property of the Parties to the Treaty; data is only released to third parties if the permission of the country concerned is obtained. Hard copies of the CRFs and observer reports are provided to SPC for inclusion in the Regional Tuna Database, and as input to the SPC database on tuna length frequencies for commercial tuna fleets. Member countries are posted summaries of CRFs relevant to fishing that has been conducted within their respective EEZ's on a monthly basis.

It is FFA's intention to migrate this system to the minicomputer and to integrate this database with the Regional Register and the Logsheet database. Vessel identifiers are treated similarly to the Logsheet database and vessels recorded here are also registered in the Regional Register. The system, which has been operational since 1988, is well developed, and rarely requires technical support.

Access to Data

FFA operates an HP9000/847 minicomputer having 4Gb of disk storage. This system operates the Oracle database system and is connected to FFA's Ethernet Local Area Network and a HP Vectra 486 file server operates under Novell Netware v.3.11. Two dial-in modems operating directly through ISDN telephone services are available for access to the Regional Register and Logsheet databases on the minicomputer. Additionally, an X.25 packet switch dial-in service is operational but dial-out capability has yet to be developed.

FFA uses two private communication networks:

(a) Regional Tuna Fisheries Management Information Network is operated under supervision of the PEACESAT Foundation of the University of Hawaii. PEACESAT ground stations have been installed in the fisheries departments of all 14 Pacific Island states of FFA. The network allows voice and file transfer capability. FFA's participation in this communications network is funded by the European Community under the Lome III convention. Member states can access the data contained on the minicomputer through this network. FFA and SPC use this network in order to transfer logsheet data files by modem. Communications over this system are free of charge.

(b) Maritime Surveillance Communication Network is funded by Australia and is installed in 11 member country surveillance centres. This system uses the Inmarsat-A satellite communications system, is point-to-point and offers voice, telex and file transfer services. Fax services are now available but are not currently used.

The member countries of PNA have an agreement in place by which they may have access to each others EEZ data held on the FFA minicomputer, and this is directly accessible via these communications networks. FFA is currently implementing an E-Mail service with remote mail capabilities for member countries to access all FFA services.

Costs

FFA's budget is broken down into two components: the General Fund, which mainly consists of member countries annual contributions, and the Trust Fund, which consists of extra-budgetary funding provided by bilateral and international donors. The Trust Fund currently accounts for around 77 per cent of the total budget. The 1993 approved budget is approximately USD3.227 million (USD0.727 million General fund, USD2.5 million Trust fund). The total cost related to data management (including collection, compilation, processing, and dissemination) at FFA is estimated at USD277,800 in 1993, only a small proportion of which would be directly related to high seas data. The costs of data collection, processing, and dissemination activities within the Agency are outlined below; however it is not possible to distinguish the costs associated with high seas fishery statistics in isolation.

Regional Register Costs: At the 1993 meeting of FFC, the Committee approved that an administration fee of USD100 per annum be charged to vessel owners for each registration, or renewal of registration, for a fishing vessel on the Regional Register. This came into force on September 1st 1993. Vessel operators are now paying all costs for the operation of the Register. Assuming that 20 per cent of the time of one professional (Manager, Monitoring, Control and Surveillance) and 100 per cent of the time of a Register Data Officer is taken up with data management activities, costs associated with operating the database are estimated at USD35,200:

	USD
Programme staff:	18,200
Communications:	9,000
Equipment/Consumables:	6,000
Miscellaneous:	2,000
Total:	**35,200**

It is not possible to estimate the proportion of these costs attributable to data generated from the high seas fisheries.

US Treaty database:

The total costs involved in maintaining the Treaty database, and administration of the Treaty are met from the funds available under the Treaty. Currently, total costs involved are around USD80,000 per year, which covers staff time (Multilateral Treaty Manager and two data clerks), office consumables, computer supplies, communication costs.

	USD
Programme staff:	59,000
Communications:	12,000
Equipment/Consumables:	6,000
Miscellaneous:	3,000
Total:	**80,000**

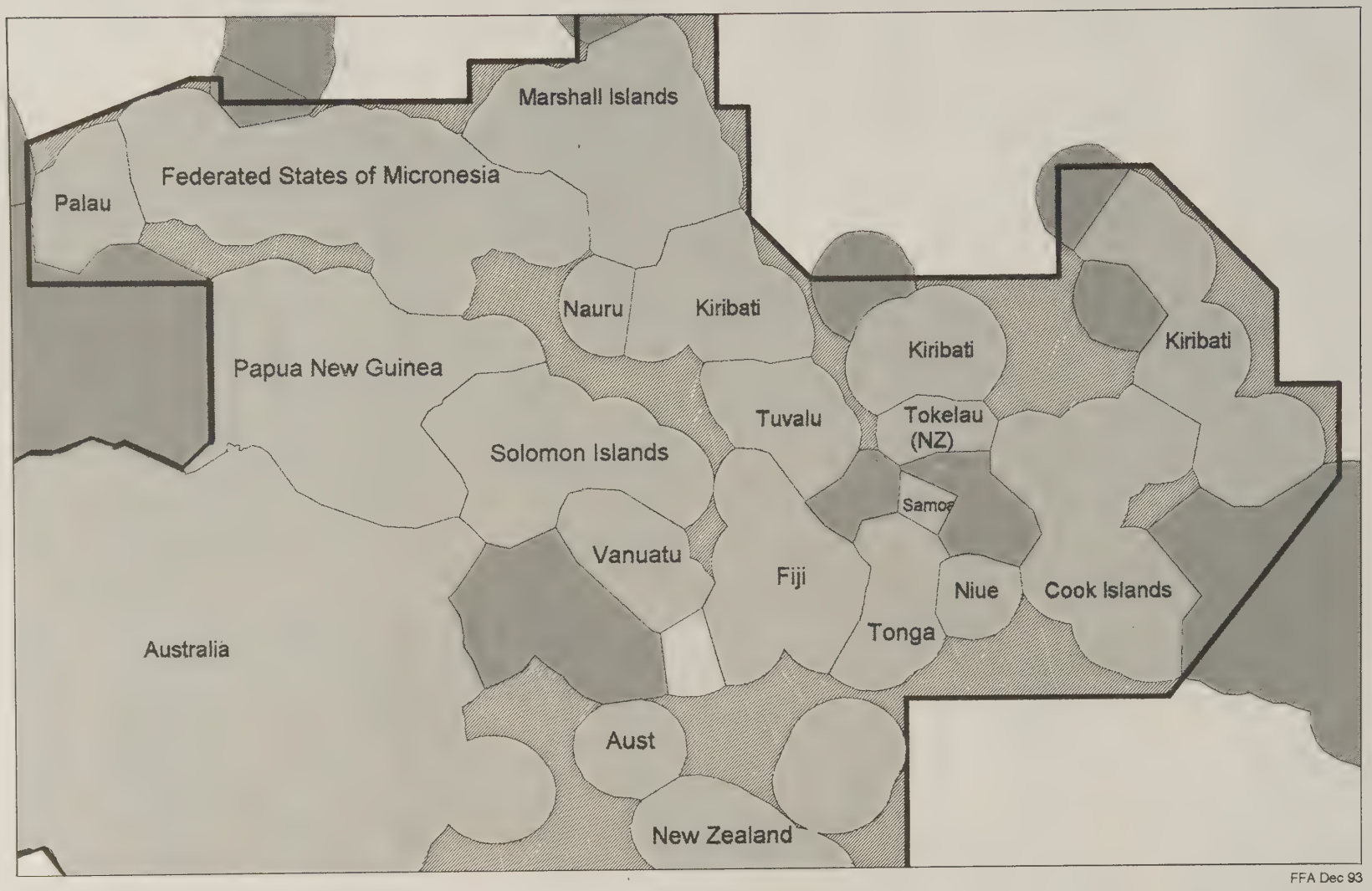
The US Government funds all costs associated with the emplacement and training of fishing vessel observers. Fishing port observer costs are met by NMFS, at no cost to the Agency.

Information Technology Division:

Data management at FFA also involves the time and inputs of 4 professional staff positions within the Information Technology Division. Given that only certain proportion of their time is expended on data management activities, the following is indicative of data management costs for this Division:

	USD
Programme staff:	125,600
Communications:	3,000
Equipment/Consumables:	31,000
Miscellaneous:	3,000
Total:	**162,600**

EEZ's & HIGH SEAS AREAS OF FFA REGION



LEGEND

- EEZ FFA member
- EEZ Non-member
- Disputed EEZ
- Area of application of US Treaty
- High seas

Annex 2

REGIONAL REGISTER OF FOREIGN FISHING VESSELS

APPLICATION FOR REGISTRATION

Forum Fisheries Agency
PO BOX 629
Honiara
Solomon Islands

Phone (677) 21124
Fax (677) 23995
Telex HQ 66336

INSTRUCTIONS:

* Underline Surname
* Address means complete mailing address
* Clearly mark the boxes with an X where appropriate
* All units Metric; Please specify if other units used
* Affix a recent 6 x 8 inch colour side photo of the vessel to this application

Name of Vessel _____ **Radio Call Sign** _____

Country of Registration (Flag) _____

Flag State Registration Number _____

If this vessel was registered before or ANY of these details have changed, please specify:

Last Vessel Name _____ Last Radio Call Sign _____

Last Country of Registration _____ Last Flag State Registration Number _____

Vessel Owner
Name .....
Address .....
.....
.....

Vessel Charterer / Operator
Name .....
Address .....
.....
.....

Vessel Master/Captain
Name .....
Address .....
.....
.....

Fishing Master
Name .....
Address .....
.....
.....

Vessel Type:
☐ Single Purse Seiner
☐ Longliner
☐ Fish Carrier / Reefer
Group Purse Seiner:
☐ Pole and Line
☐ Bunker
☐ Mothership
☐ Troller
☐ Other _____ (Please specify)
☐ Net Boat
☐ Search Boat

Hull Material:
☐ Steel
☐ Fibreglass
☐ Other _____ (Please specify)
☐ Wood
☐ Aluminium

Gross Tonnage _____ (metric tons) **Length Overall** _____ (metres)

Country Built _____ **Rated Speed** _____ (knots)

Year Built _____ **Number of Crew** _____

Total Engine Power _____ _____ (specify units)

Total Fuel Carrying Capacity _____ (kilolitres)

Satellite Communication System Present **Y / N** (Please circle your response)

Daily Freeze Method:
(You may choose more than one)
- ☐ Brine
- ☐ Air (Blast)
- ☐ Air (Coils)

Total Daily Capacity _____ tonnes/day

Storage Method:
(You may choose more than one)
- ☐ Ice
- ☐ Refrigerated Sea Water
- ☐ Brine (NaCl
- ☐ Air (Coils)

Total Storage Capacity _____ cubic meters

Complete either A, B or C as appropriate

A. PURSE SEINE VESSELS

Helicopter Reg No _____ Net Length _____ metres
Helicopter Model _____ Net Depth _____ metres
Power Block Net Pull _____ (kilos) No of Auxiliary Boats _____
Purse Winch Bare Drum Line Pull _____ (metres per minute)

Doppler Current Meter Present **Y / N** (Please circle your response)
Bird Radar Present **Y / N**

B. POLE AND LINE VESSELS

No of Automatic Poling Devices _____ Bait Storage Capacity _____ cubic metres

Bird Radar Present **Y / N** (Please circle your response)

C. LONG LINE VESSELS

Main line material _____ Max No Baskets _____
Main line length _____ kilometres Max No Hooks _____

Line Shooter Present **Y / N** (Please circle your response)

I hereby apply for registration of the above vessel on the Regional Register of Foreign Fishing Vessels maintained by the Forum Fisheries Agency.

I declare that the above information is true and complete. I understand I am required to report any changes to the above information within 60 days, and further understand that failure to do so may affect the good standing of the vessel on the Regional Register.

Application Period _____ *(eg 93/94)*

Applicant
State whether owner, charterer or duly authorised agent .....

Name of Applicant ..... Tel No _____
Address ..... Fax No _____
..... Telex No _____
.....

Signature _____ Date _____

Annex 3

REGIONAL REGISTER SUMMARY (AUGUST 1993)

FLAG/TYPE	LL	PS	RC	PL	GS	OT	BR	TOT
CHINA	95							**95**
CYPRUS			**2**					**2**
FSM		3						**3**
HONDURAS			**5**					**5**
JAPAN	317	34	16	37	3	3		**410**
KIRIBATI			1					**1**
KOREA	2	32	6					**40**
LIBERIA		2						**2**
MARIANA	1							**1**
NETHERLANDS			1					**1**
PANAMA	5	3	10					**18**
PHILIPPINES		13	15		14	10	2	**54**
RUSSIA		3	1			3		**7**
SINGAPORE							2	**2**
SOLOMONS		2						**2**
TAIWAN	157	43	18					**218**
US		42						**42**
TOTAL:	**577**	**177**	**75**	**37**	17	**16**	**4**	**903**

Key: LL - longliner, PS - single purse seiner, RC - refrigerated fish carrier, PL - pole and liner, GS - group seine net vessel, OT - search/anchor/light vessel, BR - bunker vessel.

APPENDIX I

INTER-AMERICAN TROPICAL TUNA COMMISSION

The Inter-American Tropical Tuna Commission (IATTC) was established in 1950 by a convention between the governments of the Republic of Costa Rica and the United States of America and is open to membership by other governments. Its present membership includes; in addition to Costa Rica and the United States; France, Japan, Nicaragua, Panama, Vanuatu and Venezuela. The convention mandates that the Commission's Director maintain an extensive research program to study the biology of tunas, billfishes and other kinds of fish taken by tuna fisheries in the eastern Pacific Ocean and that he recommend conservation measures required to ensure that these exploited species are maintained at levels which will provide maximum sustained harvests. In 1976 the IATTC was specifically delegated additional responsibility for conducting research on the stocks of dolphins and other marine mammals taken in conjunction with the fishery for tunas. The IATTC's objectives with regard to dolphins include maintaining tuna production at a high level, maintaining the stocks of dolphins at or above levels that would ensure their survival in perpetuity, and making every reasonable effort to ensure that dolphins are not needlessly or carelessly killed during fishing operations. Acquiring the information necessary assess the various stocks of fish and mammals, as mandated by the convention, requires a broad-based, comprehensive research program, which includes the collection of detailed data on the fisheries for tunas and ancillary biological and environmental data. In order to obtain high-quality information in a timely manner, the IATTC maintains offices in major tuna fishing ports throughout Central and South America and in the United States, and its employees regularly travel throughout the region to collect necessary data. Experience has proven that without such contact on a regular basis, data quality suffers, and in some instances the data may become unavailable. Since 1979 observers have been placed aboard purse-seine fishing vessels of the international fleet to collect data on dolphins, and since the late 1980's, they have collected an increasing variety of data from tuna fishing operations. While the IATTC's efforts are focused on the eastern Pacific Ocean, various of the species with which it is concerned, including yellowfin, skipjack and bluefin tuna and the billfishes, are distributed continuously from east to west across the Pacific Ocean, making it necessary in some cases to work in other areas to obtain the best possible understanding of eastern Pacific Ocean resources.

Fundamental to the IATTC's work are basic data on the fishing activities of vessels, the catches they make and the sizes of fish comprising the catch. These and other data are used to assess the impact of fishing on the abundance of exploited stocks. A comprehensive program of placing logbooks aboard each vessel of the international fleet is maintained, and the basic data on fishing effort and catch by time and location are extracted from these logbooks when the vessels return to port. Data on actual tonnages of catch and its final disposition are required for various purposes, and these data are obtained from processors, shipping agents, and various other sources. In addition to the collection of basic statistical data, species composition samples and samples of lengths of fish in the catch are also routinely taken when the fish are unloaded from the vessels. The length-measurement program is essential to studies of growth and size composition, which in turn are necessary for assessment of the effect of fishing on the potential yields from the various stocks.

The basic data on catch and fishing effort are used to describe the distribution, by area and time, of the fishing effort and of the catches of each species. These data are also used in models describing the dynamics of the populations being exploited in the eastern Pacific and the impact of fishing upon them. Thus the collection and interpretation of these data must be kept current, as the status of the exploited stocks is of fundamental importance to both the coastal nations of the region and to the other nations whose vessels participate in the fishery.

While of fundamental importance to stock assessment, these catch and effort-based models are not precise enough to fulfill all the requirements of routine management decisions on a timely basis. The IATTC's ability to meet the convention's mandates requires models providing a higher degree of precision for assessments of impacts of fishing on the stocks, which necessitates understanding the biology of the exploited species. Therefore among its activities, the IATTC research program provides for studies of growth, rates of mortality and natality, times and locations of spawning and recruitment, and the rates of mixing of fish among areas. In addition, since environmental variability affects the abundance and behavior of fish, research is carried out to examine environmental factors which may impact these fisheries.

The IATTC publishes Bulletins and Annual Reports which detail results of its investigations. In addition, it publishes various other reports containing data and information of interest to governments, agencies, the fishing industry and to individuals. Finally, more detailed reports may be provided following official requests of governments and researchers, though the following confidentiality policy is maintained. The IATTC has, since its inception, maintained a policy of not releasing data in forms which could reveal the operations of individual vessels or companies. This policy incorporates a provision, however, that, upon written request of the individual providing data to the IATTC, it will release copies of said data as requested. The IATTC's records are inviolable under law, and adherence to this policy has ensured the IATTC's access to significant amounts of proprietary information for use in its research and management programs.

In summary, as mandated by international treaty, information obtained from vessel logbooks, tuna processors, shipping agents, biological studies, the observer program, and from various other governmental and fishery agency sources is utilized by the Inter-American Tropical Tuna Commission to assess the effects of fishing on tunas, billfishes, marine mammals, and other species impacted by the eastern Pacific Ocean tuna fisheries.

IATTC High-Seas Fisheries Databases

Various IATTC databases have previously been described in some detail in FAO Fisheries Report No. 365 (Report of the Ad Hoc Consultation on Global Tuna Statistics). The following databases are maintained on computer disk for the period from 1959 to present. Summaries, such as catch and effort by 1° x1° area/month, are generated from the databases as required for analyses and reports.

1. Fishing vessel logbook data: These data are obtained directly from vessel logbooks, and they include both fishing and ancillary data on daily vessel operations. The data cover about 90 percent of the catch of yellowfin and skipjack tuna in the eastern Pacific Ocean. Finalized 1959-1992 logbook data require about 105 MB of computer disk space.

2. Unloading and landings data: These data are obtained from canneries, transshipment vessels and various other sources. Unloading data are weights of fish unloaded from fishing vessels, and landings data are weights of fish received at various locations for final processing or sale in fresh fish markets. Finalized 1959-1992 unloading and landings data require about 15 MB of computer disk space.

3. Vessel data: These data include information on vessel configuration, fishing equipment on board, carrying capacity, vessel registration, trip dates and skippers/navigators. Finalized 1959-1992 vessel data require about 25 MB of computer disk space.

4. Skipper data: These data include information on individuals who have commanded fishing vessels in the eastern Pacific Ocean, including names of vessels, trip dates and information such as nicknames which may be helpful in identifying skippers. Finalized 1959-1992 skipper data require about 0.5 MB of computer disk space.

The complete system for the above databases, including software, preliminary data files, summary report files, and various other support and ancillary files, as currently kept readily available on computer disks, requires about 400 MB of computer disk space.

The following databases are maintained on computer tape or disk, depending upon ongoing research projects and analysis requirements.

5. Catch and effort data are available for the 1931 to 1959 period at various levels of coverage. These data are archived on magnetic media and available when required. The 1931-1959 catch and effort data require about 7 MB of disk space.

6. Length-frequency data are available for the period from 1955 to present at sample-area/month resolution. These data are analyzed and summary information is kept available on computer. The 1955-1992 length-frequency data and ancillary files require about 36 MB of computer disk space.

7. Baitfishing data are available for 1931 to present at various levels of coverage. The most recent years' data are on computer disk, while earlier years' data are archived on magnetic media and available when required. The 1931-1992 baitfishing data require about 2 MB of disk space.

8. Longline fishing data are received from Japan, Korea and Taiwan. In the case of Korea and Taiwan, most of the data are those published in various fisheries statistics bulletins, though additional data is occasionally obtained. An IATTC member nation, Japan provides the IATTC with biological, and detailed catch and effort data from its fisheries operating in the eastern Pacific Ocean. In addition, as part of joint research studies on Pacific billfishes being conducted by the IATTC and the National Research Laboratory of Far Seas Fisheries, Shimizu-shi, Japan, the IATTC has received similar detailed data on billfishes and Japanese fisheries for the entire Pacific. The longline databases cover various periods from 1951 to present, depending on the database in question. These data and ancillary files are maintained on computer disk and require about 280 MB of disk space.

9. Various individual study data are available from research conducted by IATTC scientists and are generally archived on magnetic media. No estimate of the total disk space requirement for these data is readily available.

Computer Systems and Software

The IATTC currently maintains its high-seas databases on a VAX computer utilizing the DCL/VMS operating system and the DATATRIEVE database management system. Analyses are performed with various software, including FORTRAN, IMSL, MINITAB and SAS on the VAX, as well as on IBM compatible PC's using Quattro Pro, Lotus-123, S-Plus and various other software packages. Infrequently, analyses are also completed on the University of California, San Diego, CRAY computer system.

Budget

The cost of obtaining, processing and disseminating the IATTC's high-seas fisheries statistics, not including costs related to the scientific observer program, was about $US512,000 in 1993.

APPENDIX J

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

1. High Seas Data in Relation to the Commission's Convention Waters

The Convention area covered by the International Commission for the Conservation of Atlantic Tunas includes all the Atlantic Ocean and its adjacent seas. Hence, all the high seas of the Atlantic are under the responsibility of the ICCAT. Besides, the Mediterranean Sea, for which ICCAT also has responsibility, is under a very special status so that extended jurisdiction beyond the 3 miles (for some countries 12 miles) off the coast lines is not recognized.

Atlantic tuna and tuna-like species, for which the International Commission for the Conservation of Atlantic Tunas (ICCAT) has competence, are highly migratory species, distributed throughout the Atlantic Ocean between 50° N and 50° S and in the Mediterranean Sea. They migrate throughout the waters under the jurisdiction of several countries as well as through high-seas. The stock assessments and managements have to be made in their totality for each stock, but not by geographical areas. Consequently, the statistics collected by the Commission do not identify any political boundaries.

The basic policy of the collection of data by the ICCAT was adopted at the initial stage of the Commission's activities (in the early 1970's), with an intention to collect basic scientific information for stock assessments and management purposes, but not for regulation purposes. Even the introduction of the new U.N. Law of the Sea has not affected the ICCAT basic policy concerning statistics.

The Contracting Parties of the Commission have the obligation to submit requested statistics, bound by the Convention. However, catches by non-Contracting countries also constitute an important part of the total Atlantic tuna catches. Hence, the Commission has been making every effort to obtain the collaboration of these countries (see later section).

2. Data Collection

2.A Information required

2.A.1 Statistics for the preceding year

1. Task I catch statistics - Nominal annual catch (live weight) of tuna and tuna like species, by region, gear, flag and species.

2. Task I fishing power (fleet) statistics - Number of fishing vessels by size classes, gear and flag.

3. Task II catch and effort statistics - Catch (in number of fish and/or weight) and associated effort by smaller time-area strata (1° x 1° rectangular-monthly for surface fishery with standardized number of fishing days as unit of effort; and 5° x 5° rectangular-monthly/- quarterly with number of hooks as unit of effort for longline). The data are not necessarily of a 100 % coverage but a sample, as far as the coverage rate is known.

4. Task II size data - Actual size frequencies of samples caught by area, gear, flag, species and by month.

5. Catch-by-size data - Catch-by-size data for major species, by sampling area and by month or quarters. Information on sampling coverage and data substitutions is also required.

2.A.2 Estimates and Projected total catch for the current year

6. Quick estimates - Estimates of catches for the 1st half of the respective year by species.

7. Projected total catch - Best estimates of the respective year's catches, by species to the end of the year.

Details on specification of required data are given in Table 1.

2.B Data collection system

ICCAT requests statistics of scientists' best estimates rather than the officially compiled government statistics. Therefore, the data collection, verification and reporting are the responsibility of national scientists. The Commission encourages the national scientists to feed back their figures of estimates to the national statistical offices, if their estimates are different from the "official statistics".

The major tuna fishing countries (including some non-contracting parties) have been reporting directly to the Commission, while data for some minor tuna fishing countries are taken from the FAO Yearbook.

A limited quantity of supplemental data is collected through the ICCAT port sampling program. Samplers are hired by the Commission at selected ports in the Atlantic to collect landing data, abstracts of logbooks, and to make some biological samplings, from the fleets which are not covered adequately by the national statistical system.

3. Data Management and Dissemination

3.A Data base

All the data received at the Secretariat are entered in the data bases maintained at the Commission's computer system (Micro-VAX). They are constantly updated and verified. The data bases contain all the data in the finest time-area stratifications as they are received.

The data are kept as FORTRAN files and all the data processing is done by FORTRAN programming, not using any ready-made data base software.

The basic files are categorized in the following types:

- Task I catch (nominal annual catch) - one record for each catch entry - about 4 MB;
- Task II catch and effort (by time-area strata) - one record for a set - about 15 MB;
- Task II actual size files (size frequencies of samples) - one record for each frequency - about 26 MB;
- Catch-at-size (raised size frequencies to total catches) - one record for each frequency - about 33 MB;

- Miscellaneous biological information, including data collected by observers aboard the fishing vessels, intensified port sampling - one record for each observation - about 10 MB.
- Tag release and recapture information - one record for each tag - about 20 MB.

These files are organized for easy data retrieval and processing with keys for species, time, area, gear and flag countries.

The data quantity mentioned above (total 108 MB) is increasing at a rate of 5 MB per year. It is estimated that approximately 40% of the data correspond to the high seas, although they are not separated in the file as mentioned earlier.

3.B Data access

The Commission established the policy that the entire data base is an open system, with the exception of the confidential files which contain data revealing privacy of certain industries. At the same time, it established a policy that:

- The Secretariat does not make a special processing of the data to meet individual needs.

- A copy of the entire or a part of the base files can be provided, free of charge, to the Contracting Parties or to the collaborating regional agencies and FAO, upon request by scientists designated by the national delegation or by the agencies.

- A copy of a relevant part of the base files is available to non-contracting country's scientists, upon request, at a cost, if to be used for scientific purposes and if that institute is collaborating with the Commission's scientific work. Lower priority is given to such request, when the workload at the Secretariat is high.

Only when requested and authorized by the Scientific Committee, the Secretariat processes these data into the format which is convenient for the scientists to use for the stock assessments. Such work includes matching the total catches with detailed catch and effort data (by smaller time-area strata), and creating total catch and effort distribution in time and area or creating standardized abundance indices. These catch data by smaller time-area can be further matched to size data to create catch-at-size data base.

3.C Data dissemination

The TASK I nominal catches are annually reported in the Statistical Bulletin series. Detailed TASK II data (catch/effort and size) are summarized and reported in the Data Record series, together with the data catalogue.

4. Difficulties in Data Collection and Management

4.A Adequacy and timeliness of submission of data at national level

The Commission experiences difficulties of inadequacy of statistics and non-timely reporting. The major causes are:

- Lack of data retrieval system (e.g. logbook system) at the national level. This is particularly noticeable for artisanal fisheries.

- Incorrect data compilation at national level. For example, data provided by national statistics office are not quite accurate, due to the species misidentification, application of incorrect conversion factors etc. because the statistician lacks knowledge on biology or on actual fisheries.

- Lack of biological sampling system (for size and age of fish) at the national level.

- Intentional or unintentional misreporting by the fishermen.

- Mis-identification of species and no separation of mixed-species catches.

- Delay of collecting information, due to the long duration of a trip made by distant water fishing vessels.

4.B Difficulties at the International level

Since non-Contracting countries are not bound by the Convention, the Com- mission get the statistical information only by voluntarily collaboration of these countries. The ICCAT has been spending every possible effort to secure such statistics from non-Contracting countries, contacting directly with them or through other regional agencies (e.g. FAO, GFCM, etc. - see Section 5).

The major difficulties for the Commission lie in the statistics of fishing fleets flying flags of convenience of non-ICCAT member countries. If the change of flag is only for administrative reasons, the scientists stationed at ports of trans-shipments or unloading have been able to extract sufficient information from these fishing vessels. However, if the re-flagging is made in order to avoid the implementation of international regulation, it is very difficult to get any information on these fleet activities at high seas. At present the ICCAT is estimating the unreported catches of tuna and tuna like species by these fleets, based on trade statistics (particularly for bluefin tuna).

In this respect, the ICCAT started in 1993, a special program of bluefin statistical documents, under which all the bluefin tuna imported to the ICCAT Contracting Parties have to accompany a document validated by a Government official, indicating flag of the fishing vessel, type of fishing gear used and region where the fish come from. The Program started providing the Commission with very valuable data on the catches made by those non-Contracting countries' fleets, which are not available otherwise.

5. Collaboration with other Regional Agencies

In the past, the ICCAT has made a considerable effort in reducing the discrepancies existing in tuna catch statistics between the ICCAT base and the FAO base. These two organizations exchange nominal annual catch data and the ICCAT runs a program to compare and flag the discrepancies between these two bases. At every possible opportunity, the discrepancies have been discussed between the two agencies to clarify the causes and to offer solutions.

The ICCAT also benefits very much by holding a joint session with the General Fisheries Council for the Mediterranean (GFCM), as many Mediterranean non-ICCAT member countries with which the Commission has had difficulties in obtaining statistics are members of GFCM.

The ICCAT will also be willing to collaborate with FAO or any other regional agencies in providing data to make estimates of high seas catches. However, as explained earlier in this report, the ICCAT assessments and managements are made for the entirety of stocks of tunas and tuna-like

fish and do not separate high seas from the waters under the jurisdiction of one country. Therefore, if some other regional agencies intend to use the ICCAT data base for the purpose of estimating catches from the high seas, it will not be as simple as it seems.

If this is to be done, first the total catches have to be matched with the catches to 1° x 1° areas (or even to 5° x 5° areas in the case of longline). If the borders of EEZ run through such areas, the catches have to be partitioned between EEZ and high-seas. However, some good estimates could be made, if a certain amount of time by a qualified scientist could be spared.

6. Cost for Data Collection and Management

As the data collection and management are made in conjunction with many other administrative and scientific activities of the Commission, it is impossible to separate the cost only for that part. However, the cost estimated for the data collection and management (for 1993) is as follows:

	US$
Salaries for part of the Assistant Executive Secretary's time, full time of a systems analyst, a statistics secretary and statistics assistant:	173,630
Computer maintenance:	24,240
Computer materials:	1,200
Communications (E-mail, FAX, telephone, letters):	1,400
Publications:	7,500
Total	**207,970**

The cost for statistics relating to the high seas might be calculated as 40% of the total cost shown hereabove, i.e. US$83,190.

Table-1: ICCAT Detailed Statistical Requirements

	Forms to be used	Description	Breakdown	Areas
1. Task I Catch and Effort	1-1	Total annual (nominal) catch in live round weight	By flag, species, gear	General regions
2. Task I fishing power (fleet)	1-2	Number of fishing vessels	By flag, type of fishery, size classes	Entire Atlantic Ocean and Mediterranean Sea
3. Task II catch and effort:				
i) surface fisheries	2	Catch (in weight) and effort (in number of days fished)	By flag, gear, species, month	1° Latitude x 1° Longitude area
ii) longline fisheries	2	Catch (in weight and/or # fish) and effort (in # of hooks)	By flag, conventional and deep longlines, species, month (or quarters). For BIL and SWO by sex	5° Latitude x 5° Longitude area
4. Task II size (sample)	3-4	Sample size frequencies in Fork length (except BIL and SWO) or LJ-FL (BIL, SWO)	By flag, species, gear, month, (quarters acceptable for LL) conventional and deep longline, and sex (for BIL and SWO)	In smallest area breakdown as available and not larger than ICCAT sampling areas
5. Catch by size	3-5	Catches divided into sizes (size frequencies raised to catches)	By flag, major species (ALB, BFT, SWO, YFT), major gears, month (or quarter).	Local sampling areas
Raising and substitutions	3-6	Data substitutions and raising carried out creating catch at size, incl. sample sizes	By flag, major species, gear	Basic area-time stratum on which substitution and raising were made
6. Quick estimates	1-1	Quick estimated catch of first half of the year	By flag, major species and gears	Entire Atlantic and Mediterranean
7. Projected total catch	1-1	Projected total catch (weight) to the end of the year	By flag, major species and gears	Entire Atlantic and Mediterranean

APPENDIX K

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

Introduction

The area covered by the International Council for the Exploration of the Sea (ICES) is the STATLANT 27 area shown in Figure 1. Except at its eastern boundary north of Russia, this area coincides with the combined areas under the jurisdiction of the North-East Atlantic Fisheries Commission (NEAFC), the International Baltic Sea Fisheries Commission (IBSFC) and the North-East Atlantic Commission of the North Atlantic Salmon Conservation Organization (NASCO). Within the ICES area there are three separate high seas areas, ie areas that lie beyond the 200 nautical mile (nm) national zones (See Figure 1).

The objectives of this paper in relation to the ICES area are :

1. To describe the requirements for high seas fishery statistics for scientific, management and other purposes;

2. To describe the data currently collected, processed and stored by ICES;

3. To provide approximate costings for running the data collection, processing and dissemination activities of ICES in relation to high seas fishery statistics.

Development and Management of High Seas Fisheries in the ICES Area

Excluding tuna, which are primarily the responsibility of the International Commission for the Conservation of Atlantic Tunas (ICCAT), high seas fisheries are limited in extent in the ICES area accounting for approximately 2% of the total catch. A summary of what is known about high seas fisheries in this area was prepared for the FAO Technical Consultation on High Seas Fishing held in Rome in September 1992 and that paper is included as Annex I.

At its meeting in November 1993, NEAFC received reports by Contracting Parties on their fisheries outside national jurisdiction south of 63° North. Reports were not submitted by all countries, but those received indicate that the main species caught in the High Seas Zone, south of 63°N in 1992 and 1993, were redfish and blue whiting with smaller quantities of blue ling and other deep water species.

At its meeting in 1992, NEAFC asked ICES to provide a description of deep water fisheries in waters inside and beyond coastal state jurisdiction south of 63°N. The ICES Advisory Committee on Fishery Management (ACFM) is in the process of compiling the information required to address this request and an interim statement made in November 1993 is given in Annex II. In recent years there has been a significant development of fisheries for deep water species. It is important to distinguish between high seas and deep water fisheries, however, because most of the latter probably take place mainly within national zones. Further information on ICES initiatives relating to deep water species is included in a later section.

The management of high seas fisheries in the northeast Atlantic is the responsibility of NEAFC. Currently, the main stocks of interest to the Commission, ie those which are or have been at least partly distributed in the high seas zones are :

The northern stock of blue whiting (*Micromesistius poutassou*);
The oceanic stock of the redfish, *Sebastes mentella*;
The Norwegian spring-spawning herring stock (*Clupea harengus*);

All these stocks are "straddling stocks", ie distributed partly within national zones and partly within the high seas zone. For both these and other stocks within the NEAFC Convention area, ie including stocks which are distributed entirely within national zones, NEAFC formally requests ICES to provide management advice. In response to this request, the ACFM provides annual advice on the catches, distribution and management of all stocks for which the data are adequate. The advice provided in 1993 on the three stocks listed above is given in Annex II.

The northern blue whiting stock has been assessed annually by ACFM since large-scale fisheries on it started in the late 1970s. In 1993 ACFM was not able to carry out an analytical assessment because of uncertainties in age determination and in the absolute size of the stock. The stock was considered to be within safe biological limits, however, and ACFM advised that a precautionary total allowable catch (TAC) would be appropriate if required. At its Twelfth Annual Meeting in November 1993 NEAFC recommended that the 1993 TAC of 650,000 tonnes should be maintained in 1994, but did not make any decisions about the allocation of this TAC and decided to defer further discussion until after the United Nations Conference on High Seas Fishing.

In the case of the oceanic stock of *S. mentella* no analytical assessment was possible in 1993, partly because of the difficulties of determining the age of this species and partly because of a lack of estimates of the size of the total stock. ACFM was nevertheless able to give advice on what it considers to be safe levels of catch. At its meeting in November 1993 NEAFC did not make any decisions about the management of the stock but set up a Working Party to "review all available information relevant to the future management of the stock". The review is to include catch statistics and data on the abundance and distribution of the stock and the Working Party is asked to submit a report to NEAFC as a basis for a discussion on management measures at its 1994 meeting.

In 1993 the distribution of the Norwegian spring-spawning herring extended into the high seas zone in the Norwegian Sea, as it had done prior to the collapse of the stock in the late 1950s. ACFM provided catch forecasts for 1994 based on an analytical assessment and advised that the stock is expected to recover further at present levels of fishing mortality rate.

In addition to the stocks that come under the purview of NEAFC, the North Atlantic salmon (*Salmo salar*) is the responsibility of NASCO, under whose convention high seas fishing for salmon is not permitted. Infringements are reported to NASCO by Contracting Parties and NASCO takes these up with the flag states concerned.

Requirements for High Seas Fishery Statistics

In this section, a brief description is given of the requirements for fisheries statistics and ancillary information on all stocks within the ICES area.

Of the 130 or so stocks currently considered by ACFM, analytical assessments (i.e. assessments based on catch in number at age) are carried out on about 80 stocks. For each stock the data requirements include some or all of the following:

a) annual catch in weight, subdivided into landings and discards;
b) catch in numbers at age by vessel size and gear categories;
c) fishing effort by vessel size and gear categories;

d) mean weights at age in the catch and stock;
e) proportion of fish mature at each age;
f) natural mortality (M) at age (normally treated as constant over time);
g) results of surveys in terms of absolute estimates of biomass or numbers at age, or in terms of abundance indices.

For each species the data listed above are required on a "stock" basis. In the ICES area stocks are normally identified by the ICES statistical divisions shown in Figure 1. In some cases stocks may not fall neatly into the prescribed statistical divisions, however, and data are where necessary supplied on a finer spatial scale. In other cases more than one stock of a species may occur within a statistical division and in this case further biological information is needed to separate catches into their component stock units.

In the case of fishing effort, it is necessary to define the effort directed at the stocks in question. Particularly in fisheries taking a mixture of species, this requires information on catch by species and effort at the finest level of disaggregation possible. This information is provided to ICES Working Groups by national scientists and is published in appropriately aggregated form in the working group reports, of which approximately 22 are prepared each year.

In addition to single species stock assessments, ICES wherever possible carries out multispecies assessments that take both technical and biological interactions into account. There have recently been initiatives, furthermore, to carry out assessments on a multifleet, multispecies and area basis, and to include economic data in the assessments. The models required are in the process of development, but it is clear that the data demands for such initiatives will involve data at a fine level of spatial, temporal and fleet disaggregation.

The requirements outlined above apply equally to stocks within and outside national zones. For new and developing high seas fisheries there may in addition be requirements to carry out fundamental studies to investigate the biology and distribution of the stocks concerned. An important aspect of stock assessment is the identification of unit stocks, which for present purposes can be defined as geographical units that can be assessed and managed in such a way as to safeguard discrete reproductive units. As it is not possible to determine the appropriate geographical units without information on the geographic distribution of each species, it will be necessary for high seas fishery statistics to be reported on a geographical and temporal scale that will allow the appropriate stock divisions to be identified, e.g. by month and statistical rectangle.

In addition to the data required for stock assessment, ICES recognizes that it has a responsibility to provide a data service to its customers - the international fisheries comissions, member governments, the Commission of the European Community and the wider scientific community. These data are supplied on request as they become available, but the definitive publication, "ICES Fisheries Statistics", is not published until all countries have submitted their final data.

Data collected, processed and stored by ICES

a) STATLANT 27 Reporting System

Since 1902, catch and effort statistics have been reported to ICES by national statistical offices. The most complete series of data is that of annual catch data subdivided by ICES Division submitted under the STATLANT 27A reporting system (Figure 1). In practice, these are landings data referring to the areas in which the catches were made. All commercially important species or groups of species are listed separately, but in some cases species may be combined in composite

categories. This applies to species that are difficult to identify separately and to catches in fisheries where a large number of species is taken. It may also apply to catches made in developing fisheries on newly-discovered stocks, for example in deep water. For this combination of reasons, a considerable proportion of the catches made in the high seas zone of the ICES area (eg Sub-areas X and XII) are reported in combined categories (Annex I).

Catches in ICES Sub-areas X and XII for the years 1984-1988 are given in Appendix I. For the years subsequent to 1988 the record for these areas is incomplete owing to the lack of reports for some countries that may have fished in these areas or to the fact that the reports received have not yet been checked and processed. Because of the incompleteness of the records, no further tabulations are given in this paper.

Even for those ICES Divisions that contain high seas areas, no data are available to divide the catches between those taken within and outside national zones. As pointed out in Annex I, it is possible that a considerable part of the catches reported from Sub-areas X and XII were in fact taken within national zones, and for Sub-areas I, II, VII, VIII, IX and XIV, it is likely that a very high proportion of the reported catches were from within national zones. From the data currently held by ICES, it is thus not possible to provide a description of data on high seas catches.

It was recognised at the *Ad hoc* Inter-Agency Consultation on Atlantic Fishery Statistics held in Dublin in September 1993, however, that information on catches from the high seas areas may be required separately by management bodies and it was agreed that a proposal for appropriate changes to the STATLANT 27A reporting system should be made at the meeting of the Coordinating Working Party on Atlantic Fishery Statistics (CWP) in 1994. To meet this requirement, it would be necessary to subdivide each of the ICES divisions that straddles the 200 mile limit into areas within and outside national zones.

As a result of the development of new fisheries for deep water species in the ICES area, additional changes may be needed in the list of species and species codings presently included in the STATLANT 27A forms (ICES Document C.M.1979/D:2 and later unpublished revisions). In this connection, ICES has now established a Study Group on the Biology and Assessment of Deep-Sea Fisheries Resources which is to meet in August 1994. As one of its terms of reference (Annex III), the Study Group has been requested to "advise on additions to the list of species for which national catch data are required."

The STATLANT 27 data from 1973 onwards are stored at ICES in SAS and COBOL programs are used for extracting the data.

Although the current reporting scheme does not require data broken down more finely than ICES Divisions, there is in place an alphanumeric coding for all statistical rectangles within the ICES area (ICES Document CM 1977/Gen:3). This is based on rectangles of 30' latitude x 1° longitude, which are approximately 30 x 30 nautical miles at latitudes in the centre of the ICES area. Some countries within ICES are known to collect records of catches and fishing effort by these rectangles as part of their statutory requirements. In some cases these data are submitted to ICES, either within the STATLANT 27B returns, or via ICES Working Groups. There is at present, however, no organised data-base by statistical rectangle.

b) Additional Fisheries Databases

In addition to the STATLANT 27A and 27B reports, ICES maintains a number of more detailed databases. These are:

i) the ICES Fisheries Assessment Package (IFAP) which runs in SAS version 6.07 under UNIX on a HP 9000 Workstation. This incorporates the detailed requirements for each stock listed in an earlier section of this paper, and currently contains data on about 140 stocks or combinations of stocks.

ii) the International Bottom Trawl Survey Database, which is stored in a SIR database system.

iii) the North Sea Database prepared by the Scientific and Technical Committee on Fisheries of the Commission of the European Communities, incorporating detailed data by statistical rectangle including landings and discards in number at age, fishing effort and value data.

Progress reports on the fishery statistics held by ICES are submitted each year to the Statistics Committee of ICES. The most recent one is available as ICES Document CM 1993/D:3.

Costings for Data Collection, Processing and Dissemination

The costs given below include the salaries and overheads that can be attributed to the provision of a fishery statistics service within the ICES Secretariat, together with the cost of publishing "ICES Fisheries Statistics". They thus do not include the national costs of collecting, processing and distributing these statistics or the costs incurred by the Fishery Commissions.

	Danish kroner	US $
Salaries	600,000	89,600
Overheads	320,000	47,800
Publishing	58,000	8,700
Total	978,000	146,100

At present a high proportion of the above costs relate to fishery statistics within zones of national jurisdiction and it is not possible provide costings relating to high seas fisheries. To a first approximation, about 5% of present costs might be attributed to high seas fishery statistics but it is expected that this will increase in the near future.

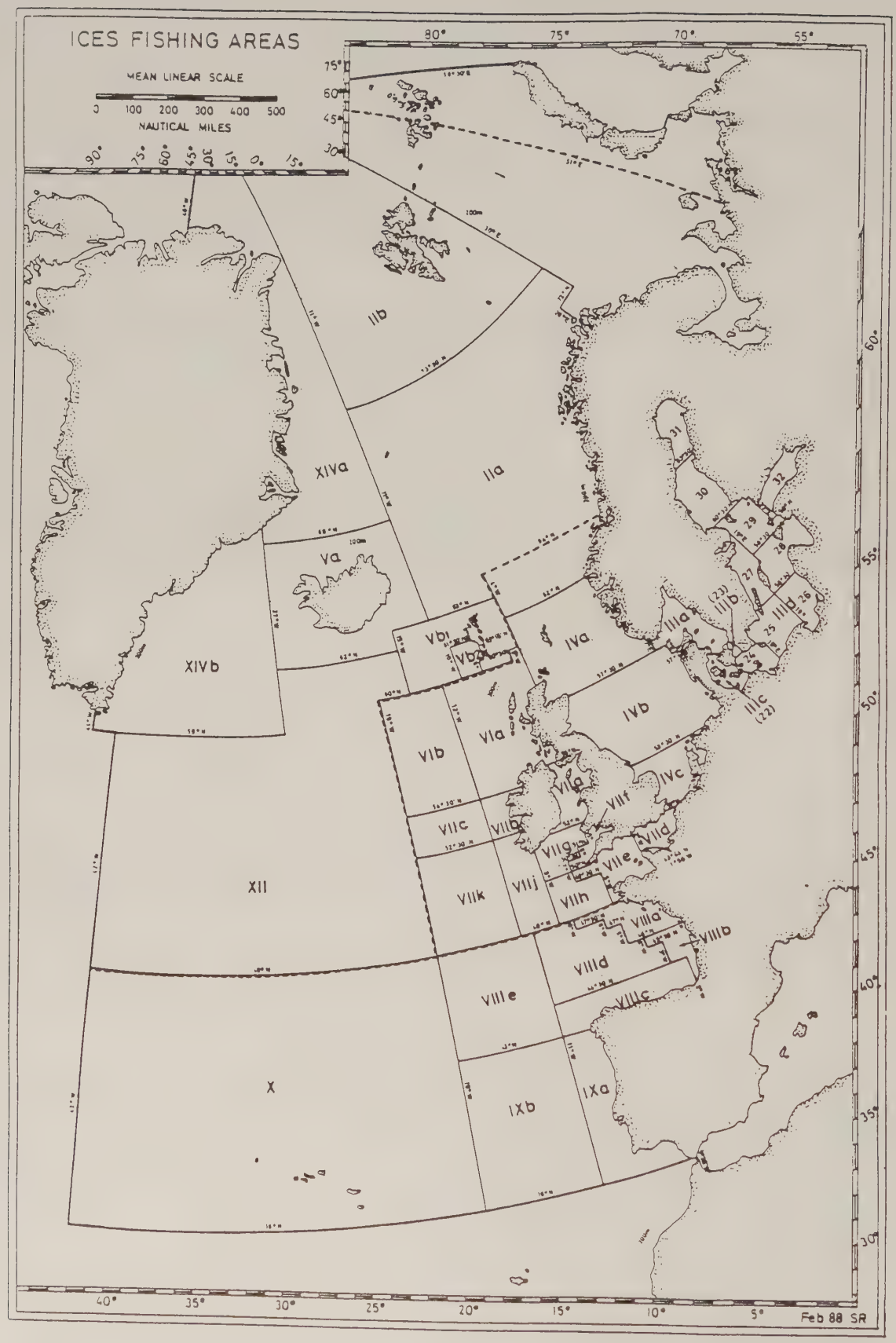


Figure 1 The ICES Area. Divisions within the NEAFC area are given as dashed lines.

Annex 1

FAO Technical Consultation on High Seas Fishing Rome, 7-15 September 1992

HIGH SEAS FISHERIES IN AREA 27: STATISTICS AND RESEARCH

prepared by the

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Introduction

The International Council for the Exploration of the Sea (ICES) is an inter-governmental organisation concerned with the coordination and promotion of marine research and with the provision of advice on fisheries and environmental management in the North Atlantic. The advice on fisheries management is provided to Fishery Commissions and Member Country governments which are responsible for fishery management. This paper is, therefore, restricted to the topics covered in Theme 1 of the Consultation, namely Statistics and Research.

High Seas Areas

For the purpose of this paper, high seas zones are defined as areas beyond the 200 nautical mile (nm) national zones. Within the ICES fisheries statistical area in the Northeast Atlantic (Fishing Area 27), there are three such areas (Figure 1), the major area in the open ocean which covers most of Sub-areas X and XII (but also parts of Sub-areas VII, VIII, IX, and XIV), an area in the Norwegian Sea in Sub-area II, and a relatively small area in the Barents Sea in Sub-area I. Areas within 200 nm of land where fishing restrictions have not been applied because of disputes concerning the position of boundaries between national zones (e.g. the former "White Zone" in the Baltic Sea), are not considered here and such areas are now not of major importance in the ICES area.

High Seas Fishery Statistics

All ICES Member Countries are required to submit fishery statistics under the STATLANT 27 reporting scheme which covers all of Fishing Area 27, including the high seas areas. All coastal states in Fishing Area 27 are members of ICES with the exception of Estonia, Latvia and Lithuania (some of which are expected to join ICES in the near future). Catches taken in Fishing Area 27 by non-ICES Member Countries are believed to be relatively minor, and reports from some of these countries (e.g. Bulgaria and Taiwan) are provided to FAO and the International Commission for the Conservation of Atlantic Tunas (ICCAT).

Although statistics for high seas areas are included in the STATLANT 27 reporting scheme, high seas statistics are not identified separately and, as there is little coincidence between high seas areas and ICES fishing areas used for the STATLANT 27 reports, it is not possible to determine the high seas components. However, in response to requests from the North-East Atlantic Fisheries Commission (NEAFC), ICES provides some information on the distribution of the populations and catches in relation to national and high seas zones for the northern stock of blue whiting (*Micromesistius poutassou*), the oceanic stock of redfish (*Sebastes mentella*) and Norwegian spring-spawning herring (*Clupea harengus*); these data are all collected by ICES Assessment Working Groups. These stocks are, or were in the case of the herring, straddling stocks which NEAFC is concerned with managing, although the Norwegian spring-spawning herring stock has shown a change in its distribution and is not at present considered a straddling stock. In addition, there is some fishing for salmon on the high seas in the ICES area in contravention of the North Atlantic Salmon Conservation Organization (NASCO) Convention and ICES has provided NASCO with estimates of the quantities involved.

Considerable quantities of tuna and tuna-like species are taken in high seas areas of Fishing Area 27, but ICES has no information on the zonal distribution of the fisheries or the stocks. ICES does not undertake any assessment of tuna stocks and all such work is undertaken by ICCAT which can provide detailed fishery statistics for these species.

Though not separately identified in the statistics reported to ICES, fishery statistics for the high seas areas can be provided separately by most of the countries fishing on the high seas. However, it is difficult to determine the quality of high seas data. It might be inferior because generally there is less inspection in high seas areas. Alternatively, there are often fewer incentives to misre-

port catches taken in high seas areas, although the data could be distorted by misreporting catches from national zones as high seas catches.

Research in High Seas Areas

ICES promotes and coordinates research throughout Area 27, irrespective of zonal boundaries. There are no specific research programmes for high seas areas; nor are there difficulties in conducting research studies which are peculiar to high seas areas.

An example of such coordination is a joint Icelandic-Russian acoustic survey for redfish which took place in the period May-July 1992 covering parts of the Greenlandic, Icelandic and high seas zones. In addition to abundance and distribution data, the survey (involving two ships) was designed to collect a wide range of biological and hydrographic information. Such surveys and other research work on redfish stocks are coordinated by the ICES Study Group on Redfish Stocks.

International acoustic surveys for blue whiting covering parts of national and high seas zones have for many years been coordinated by the ICES Blue Whiting Assessment Working Group or by individual Working Group members.

Oceanic High Seas Area

Figures 2 and 3 show the reported landings by species from ICES Sub-areas X and XII which include most of this high seas area. Although these Sub-areas do include some parts of national zones, the figures give an indication of the most important species in this high seas area.

In Sub-area X, tuna and tuna-like species are the most important high seas species (horse mackerel is taken almost exclusively in national zones). Because ICCAT holds more detailed and reliable data for tuna and related species than ICES, no further consideration will be given in this paper to these species. Table 1 shows how the quantities of the different species caught in Sub-area X varied during the period 1984-88.

Redfishes dominate the catches in Sub-area XII where some blue whiting (poutassou) are also taken. Table 2 shows how the catches have varied by species in Sub-area XII during the period 1984-88.

The ICES North-Western Working Group (ICES C.M.1992/Assess:14) has allocated all redfish catches in Sub-divisions V, VI, XII and XIV to three stocks: *S. marinus*, deep sea *S. mentella* and oceanic *S. mentella*. All catches of *S. marinus* and deep sea *S. mentella* stocks have been within national fisheries zones. In contrast, catches of the oceanic *S. mentella* stock have so far been taken almost exclusively in high seas areas in Sub-areas XII and XIV, with the exception of minor catches within the national fisheries zones of Greenland and Iceland. From the distribution information available, it is obvious that a substantial part of the adult oceanic stock of *S. mentella* is found, at least at times, within the national fisheries zones of Iceland and Greenland (Figure 4).

Oceanic *S. mentella* have been taken only in Sub-areas XII and XIV (Tables 3 and 4). This fishery started in 1982 exploiting the virgin stock with landings of about 60,000 t and these increased to about 105,000 t in 1986. The landings then dropped suddenly from about 90,000 t in 1988 to about 37,000 t in 1989 due to a decrease in the USSR (Russian) effort. The decreasing trend in landings continued and in 1991 the total landings were 23,000 t.

Iceland and Norway entered the fishery in both Sub-areas in 1989 and 1990, respectively. The former German Democratic Republic vessels ceased fishing in both Sub-areas in 1991. In 1991, Bulgaria and Russia were the only countries fishing in Sub-area XII.

Catch-per-unit-effort (CPUE) data for oceanic-type *S. mentella* fisheries in both Sub-areas are given in Table 5. CPUE for the Russian fleet declined in 1991 while revised CPUE for the Icelandic and Norwegian fleets displayed a clear increasing trend. This latter fact is explained by the introduction of trawls with larger openings and by the fishermen gaining more experience. Since the Russian fleet has used the same trawl since the start of the fishery in 1982, its time series may better reflect the stock situation. However, overall the CPUE data may not be very useful and so should be interpreted with care.

Norwegian Sea High Seas Area

The main species exploited in this high seas area is blue whiting. Figure 5 shows the total catches of the northern stock of blue whiting as allocated to fishing zone by the ICES Blue Whiting Assessment Working Group (ICES C.M.1992/Assess:3). The catches labelled "High Seas" are mainly taken in the Norwegian Sea high seas area; only a very small proportion is taken in the oceanic high seas area (Table 2). It is important to note that the Jan Mayen zone was established in 1980 and catches were first allocated to it in 1981; most of the catches allocated to the "High Seas" zone prior to 1981 were taken in the area that subsequently became the Jan Mayen zone. After 1981 when the stock declined, fishing ceased in the Jan Mayen zone.

This blue whiting stock is distributed throughout many national and high seas zones during different life stages. Spawning takes place in the spring mainly along the edge of the continental shelf west of Britain and Ireland. Following spawning, the adults move northward to

feeding grounds where they remain until the winter when they start migrating back to the spawning areas (Figure 6). Juveniles tend be to found mainly in the eastern Norwegian Sea and North Sea. An acoustic survey in July/August 1990 showed the distribution in the Norwegian Sea during that part of the feeding season (Figure 7). Figure 8 summarises the distribution of the fisheries which take place in different seasons.

Norwegian spring-spawning herring traditionally spawned on the west coast of Norway, migrated for the summer to a feeding area northeast of Iceland, over-wintered east of Iceland and north of the Faroes, and then migrated back to Norway in early spring. However, in the late 1960s the feeding moved north and east towards Bear Island and the stock now spends most of the year in the Norwegian zone rather than in the Icelandic, Faroese and high seas zones.

The ICES Working Group on North Atlantic Salmon (ICES C.M.1992/Assess:15) estimated that unreported catches of salmon taken in the high seas area in the Norwegian Sea, in contravention of the NASCO convention, were in the range 180-350 t in the 1989/90 season. This assumed that seven vessels were involved. Activity in the 1990/91 season was much reduced with only one or two vessels thought to have been operating, indicating a catch of 25-100 t.

Barents Sea High Seas Area

This is the only one of the three high seas areas which lies over the continental shelf and, therefore, has the potential for demersal trawling in depths of 200-400 m. Neither NEAFC nor the Norwegian-Russian Fishery Commission sets management measures for this area, and fishing is controlled to some extent by a number of bilateral agreements. Despite some press reports of extensive fishing, scientists believe that the quantities are small and have estimated that the total catch of cod in the area in 1991 was only 500 t. Cod is by far the most likely species to be caught, but small quantities of haddock, Greenland halibut and redfish are probably also taken. It is unlikely that capelin are taken, except very occasionally, because the stock spends very little time in the area. In summer capelin are distributed further north and in winter further south, and they rapidly migrate through the high seas area.

Table 1. Total international reported catches ('000 t) for ICES Sub-area X, 1984-1988.

Species	1984	1985	1986	1987	1988	1984-88
Var. tuna-like scom.	4.7	6.6	15.5	16.5	18.0	12.2
Albacore	3.2	2.0	2.5	3.0	0.5	2.2
Horse mackerel	3.7	3.7	0.0	3.1	0.0	2.1
Fishes unsor., unid.	1.2	0.5	0.7	0.8	3.5	1.3
Sea breams	0.9	0.9	0.9	0.8	1.4	1.0
Var. mackerel-like scom.	0.4	0.4	3.7	0.3	0.0	0.9
Bluefin tuna	2.5	0.9	0.0	0.0	0.0	0.7
Var. demersal percom.	0.3	0.3	0.0	0.9	0.9	0.5
Dogfishes and Hounds	0.9	0.9	0.0	0.4	0.0	0.4
Others	0.2	0.1	0.5	0.4	0.5	0.3
Conger eel	0.2	0.3	0.3	0.3	0.4	0.3
Mackerel	0.8	0.0	0.7	0.0	0.0	0.3
Various gadiformes	0.3	0.3	0.3	0.0	0.4	0.3
Various non-teleost fishes	0.0	0.0	0.7	0.0	0.0	0.1
Pilchard	0.0	0.2	0.0	0.0	0.0	0.0
Total	19.3	17.0	25.8	26.5	25.5	22.8

Table 2. Total international catches ('000 t) for ICES Sub-area XII, 1984-88.

Species	1984	1985	1986	1987	1988	1984-88
Redfishes	60.6	17.3	24.1	2.9	9.8	22.9
Various gadiformes	6.8	6.6	24.8	11.4	10.9	12.1
Fishes unsor., unid.	15.2	0.8	10.7	0.8	0.8	5.7
Poutassou	11.1	3.0	1.7	8.2	1.3	5.1
Others	0.6	0.0	0.3	0.0	0.2	0.2
Mackerel	0.0	0.7	0.0	0.0	0.0	0.1
Var. tuna-like scom.	0.0	0.0	0.0	0.5	0.0	0.1
Total	94.4	28.3	61.6	23.9	23.0	46.2

Table 3 *S.mentella*, oceanic stock. Landings (in tonnes) by area as used by the ICES North-Western Working Group.

Year	XII	XIV	Total
1982	39,783	20,798	60,581
1983	60,079	155	60,234
1984	60,643	4,189	64,832
1985	17,300	54,371	71,671
1986	24,131	80,976	105,107
1987	2,948	88,221	91,169
1988	9,772	81,647	91,419
1989	16,892	21,325	38,217
1990	7,039	24,477	31,516
1991	5,673	17,613	23,286

Table 4. *S. mentella*, oceanic type. Landings (in tonnes) by country as used by the ICES North-Western Working Group.

Year	Bulgaria	German Dem.Rep.	Germany, Fed.Rep.	Faroes	Iceland	Norway	Poland	USSR	Total
1982	0	0	0	0	0	0	581	60,000	60,581
1983	0	155	0	0	0	0	0	60,079	60,234
1984	2,961	989	0	0	0	0	239	60,643	64,832
1985	5,825	5,438	0	0	0	0	135	60,273	71,671
1986	11,385	8,574	0	5	0	0	149	84,994	105,107
1987	12,270	7,023	0	382	0	0	25	71,469	91,169
1988	8,455	16,848	0	1,090	0	0	0	65,026	91,419
1989	4,546	6,796	1	226	3,816	0	112	22,720	38,217
1990	2,690	7,950	7	0	4,537	7,085	0	9,247	31,516
1991[1]	2,500[2]	0	180	115	9,861	4,307	0	6,323	23,286

[1]Provisional.
[2]Estimated.

Table 5. Catch per unit effort for oceanic-type *S. mentella* in Sub-areas XII and XIV.

Year	CPUE (t/h)				
	Bulgaria	GDR	Iceland	Norway	USSR-Russia
1982	-	-	-	-	1.99
1983	-	-	-	-	1.60
1984	1.25	-	-	-	1.48
1985	1.85	-	-	-	1.68
1986	2.04	-	-	-	1.35
1987	1.22	0.79	-	-	1.10
1988	1.22	1.28	-	-	1.00
1989	0.82	0.70	1.03	-	1.00
1990	-	0.89	1.12	1.09	0.99
1991	-	-	1.49	1.35	0.80

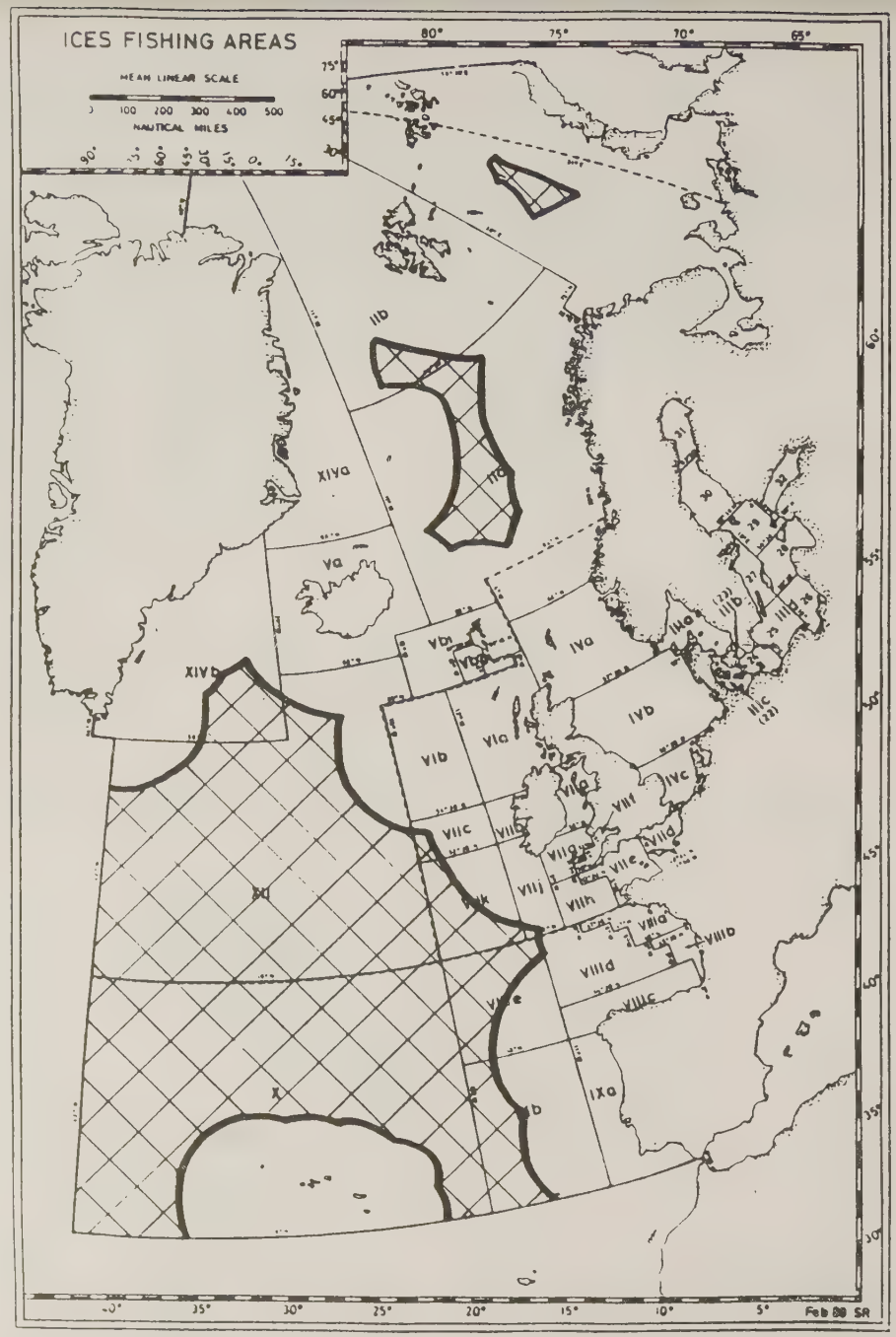


Figure 1. High seas areas (hatched) in relation to ICES fishing areas.

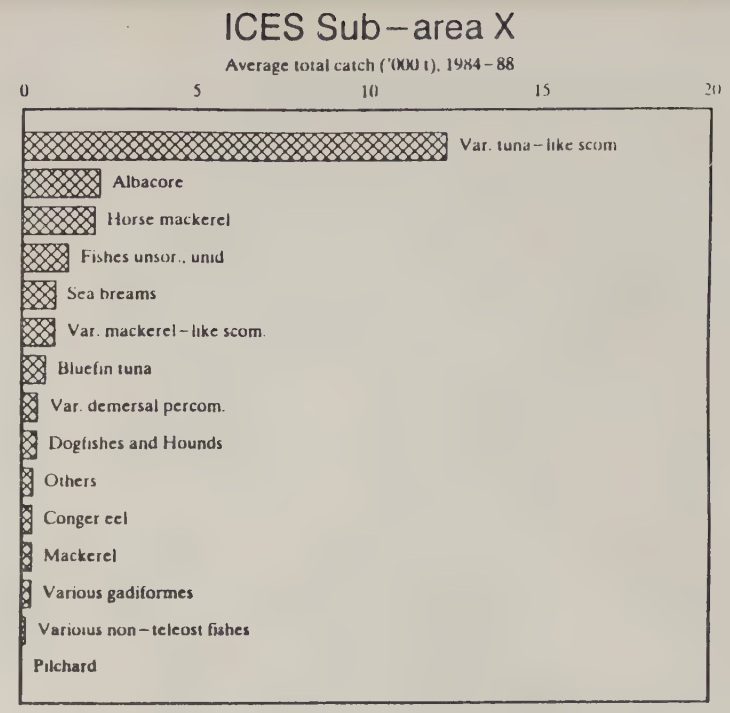


Figure 2. Average catches for 1984-88 in ICES Sub-area X.

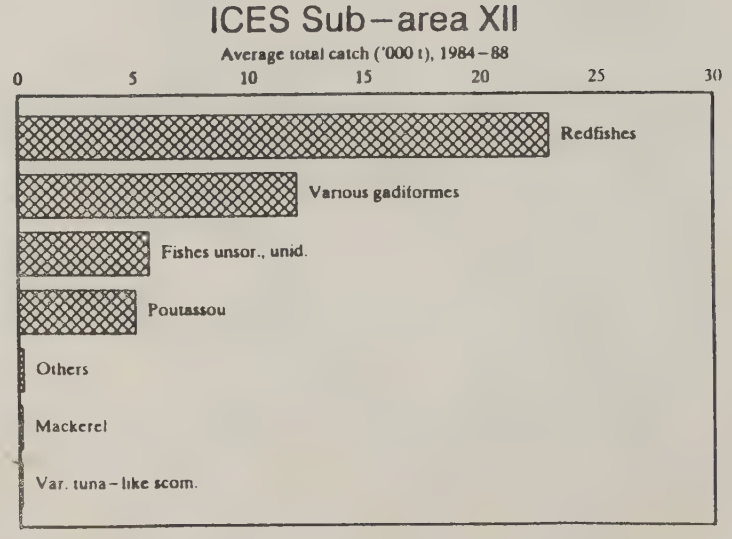


Figure 3. Average catches for 1984-88 in ICES Sub-area XII.

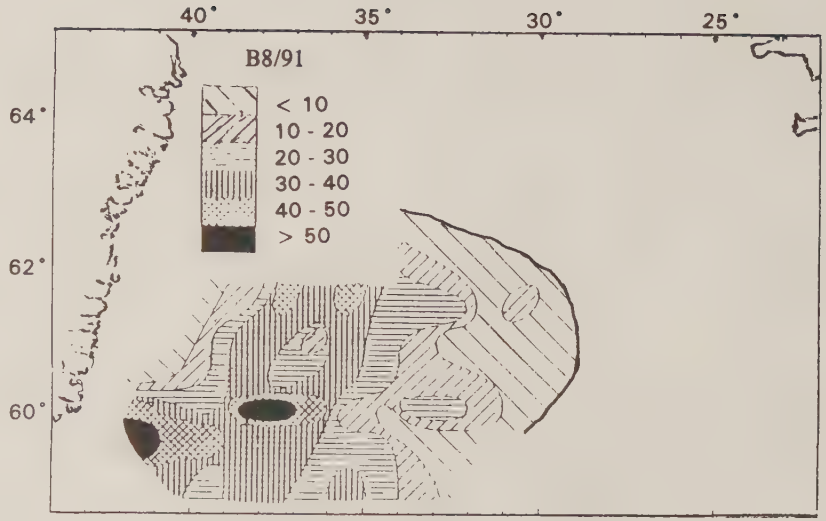


Figure 4. Relative distribution of oceanic *Sebastes mentella* based on echo values obtained on an Icelandic acoustic survey in June 1991.

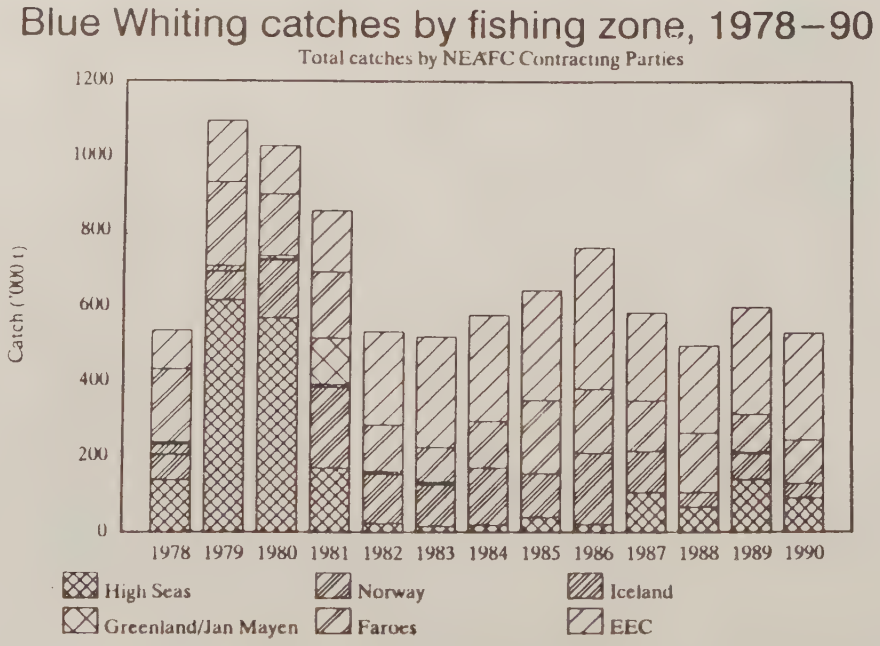


Figure 5. Catches of northern blue whiting by fishing zone.

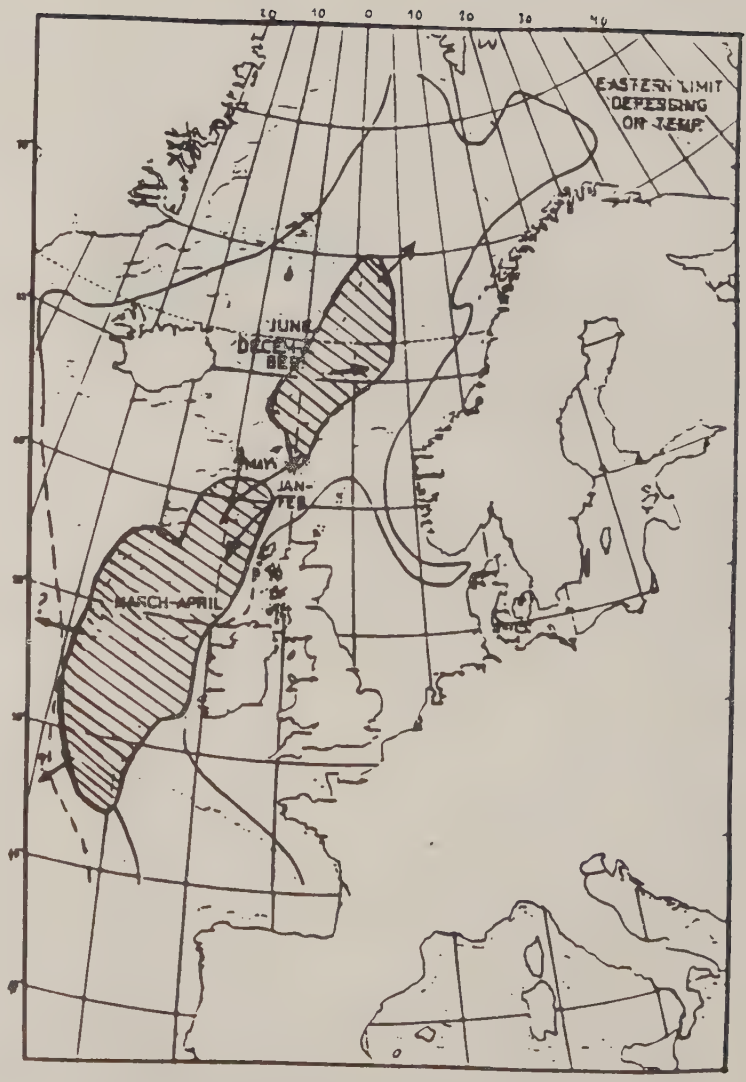


Figure 6. Blue whiting adult distribution and migration..

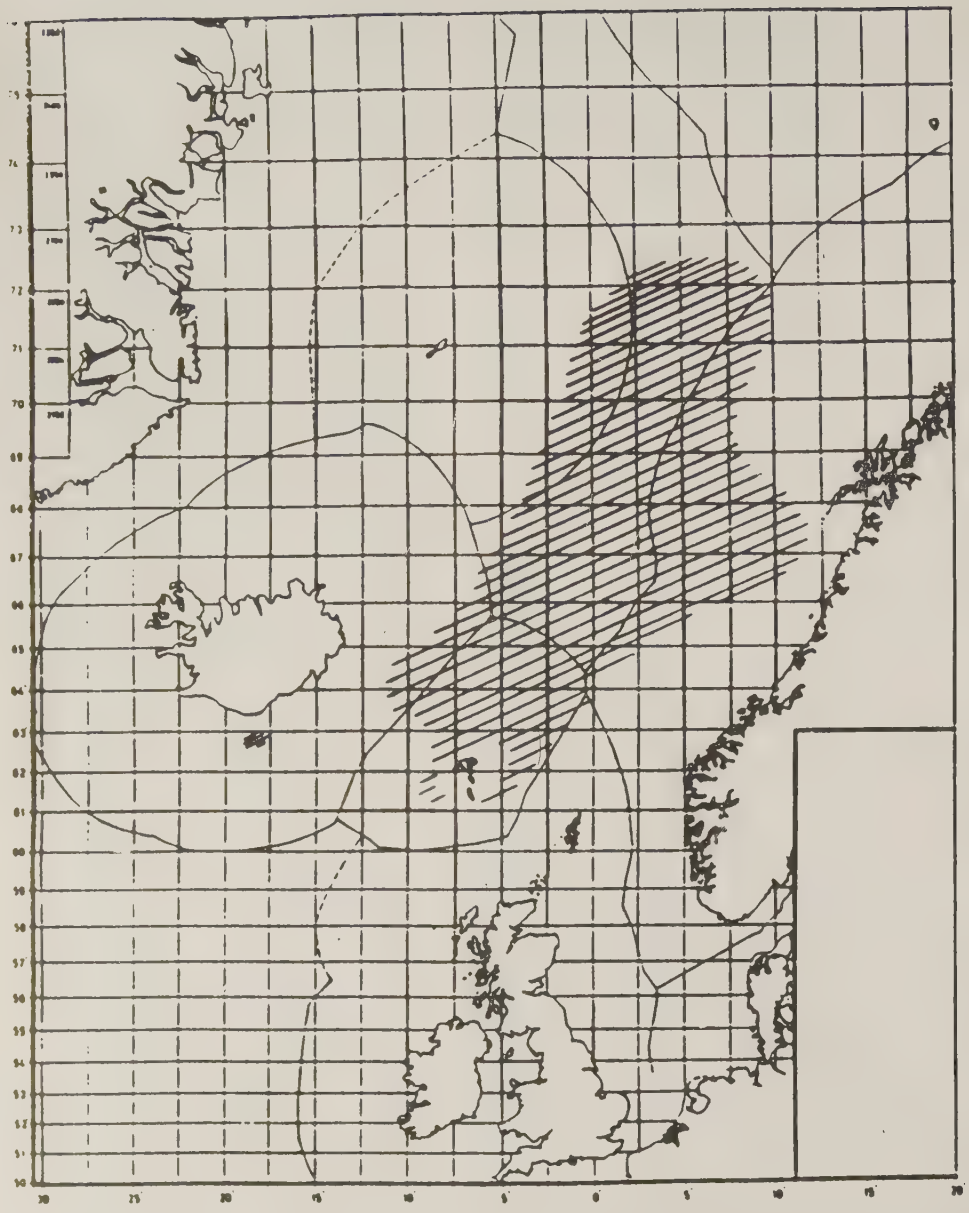


Figure 7. Area of blue whiting distribution observed during July/August 1990 shown in relation to fishing zones.

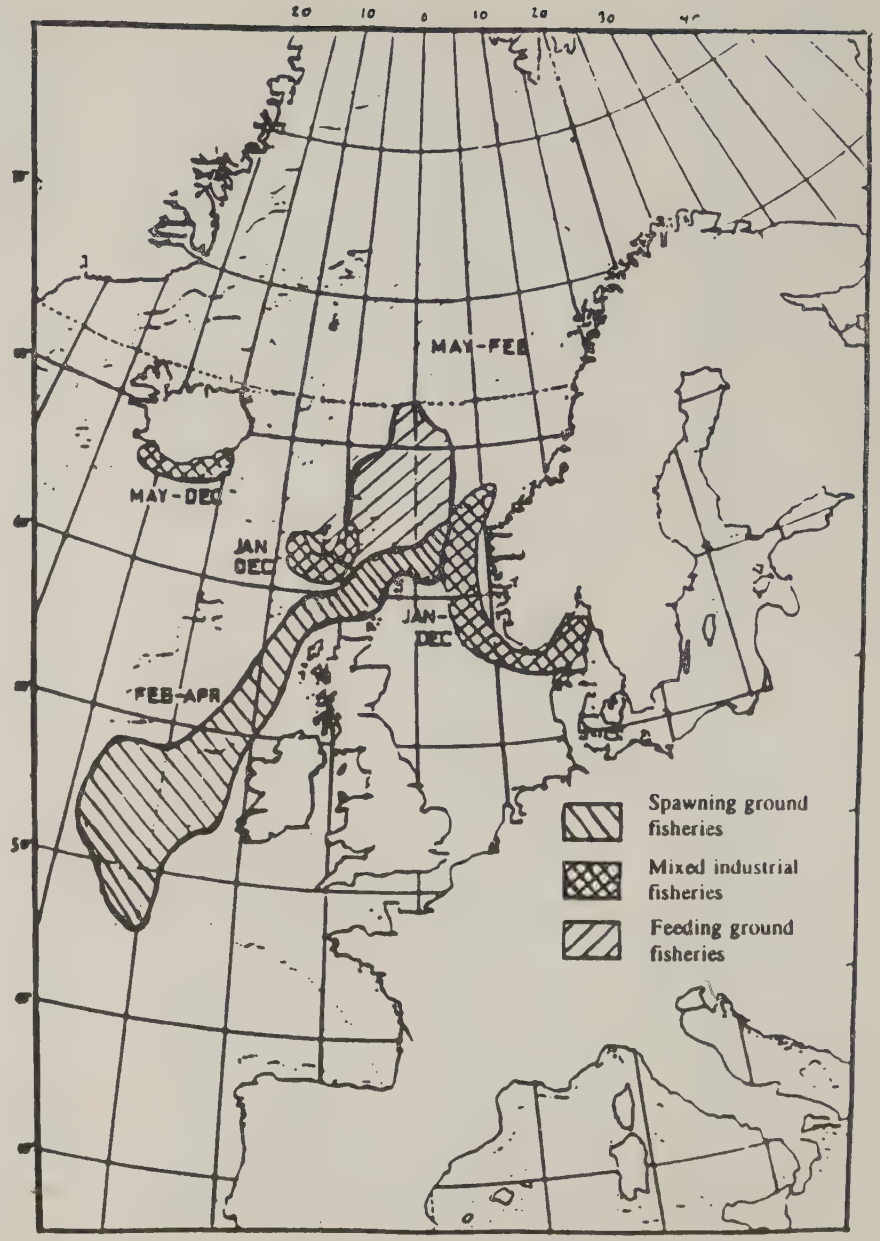


Figure 8. Summary of various fisheries on the northern blue whiting stock.

Annex 2

Advice on high seas/straddling stocks in the ICES area given by ACFM at its meetings in 1993

A. Redfish in Sub-areas V, VI, XII and XIV

Stocks

The Irminger Sea redfish stock complex comprises *S. marinus* and *S. mentella* stocks on which the so-called "traditional" redfish fishery along East Greenland, Iceland and Faroes coasts is based and the *S. mentella* oceanic stock which is fished in the open sea, mainly in international waters outside the national economic zones. At present, ACFM has no new evidence at hand to justify splitting the *S. marinus* and *S. mentella* stocks fished in the traditional redfish fishery into separate stock units in Greenland, Iceland or Faroese waters. Although the area separation of the spawning stocks of the oceanic-type and traditional *S. mentella* has not yet been well defined, the Study Group on Oceanic-type *Sebastes mentella* (ICES, C.M.1990/G:2) and the Study Group on Redfish Stocks (ICES, C.M.1992/G:14) considered the oceanic type to be a separate stock.

Landings

The total landings from the Irminger Sea redfish stock complex (i.e., redfish in all Sub-areas) reached their highest level on record in 1982 with some 230,000 t. Since then, landings have declined to the level of 143,000 t in 1990 but increased again to 168,000 t in 1992 (Tables 2.7.1 - 2.7.4). The catches based on the oceanic *S. mentella* reached a maximum of 105,000 t in 1986 (Table 2.7.13). Since then, the catches have declined to approximately 91,000 t in 1987 and 1988 and to the very low levels of 38,000 t, 32,000 t and 23,000 t in 1989, 1990 and 1991 respectively. The 1991 catches of only 23,000 t were the lowest since the beginning of this fishery. In 1992 the catches were up to the level of 57,000 t.

Stock Distribution with Respect to National Fisheries Zones

The distribution of the *S. marinus* and the traditional *S. mentella* stocks in the national fisheries zones is reflected in the catch statistics. All catches taken in ICES Sub-area XIV are within the national fisheries zone of Greenland. Likewise, catches reported in Divisions Va and Vb are taken within the national fisheries zones of Iceland and the Faroes, respectively. In Sub-area VI, the catches could be taken within the fisheries zone of the EC (United Kingdom) or the Faroe Islands, depending on where they are taken.

ACFM noted that the newly found distribution of traditional *S. mentella* in international waters in the Irminger Sea might also have an impact on considerations on stock distribution with respect to national fisheries zones.

Catches from the oceanic *S. mentella* stock have so far all been taken in Sub-areas XII and XIV, and recently also in minor quantities in Division Va almost exclusively in international waters, i.e., outside the national fisheries zone of the neighbouring countries with the exception of some catches within the national fisheries zone of Greenland and, at the beginning of 1991, also in the Icelandic fisheries zone. In 1992 about 2,000 t were taken in the EEZ of Iceland.

From distribution information available it is obvious that a substantial part of the adult oceanic *S. mentella* stock is, at least at times, to be found within the national fisheries zone of Iceland and Greenland. In the present state of knowledge, ACFM has no way to quantify the proportion of the adult stock occurring in respective national zones.

Assessments

ACFM would like to point out some inherent problems in assessing redfish stocks and in advising TACs for them:

The catch is landed as redfish with no specification as to species. The necessary allocation of the landings by species therefore has to be done on the bais of sampling, which has now become difficult because of increased processing at sea. Age determination of redfish is a very difficult task for several reasons. The growth is very slow, the growth increments are indistinct both in scales and otoliths, and the fish recruit to the fishery at a late age. Furthermore, a validation of the ageing methods is badly needed.

Area coverage on ichthyoplankton and acoustic surveys for oceanic *S. mentella* has differed from year to year and the survey results therefore do not necessarily reflect changes in stock abundance. The acoustic estimates have (apparently) improved and a comparison of the estimates in a given area between 1991 and 1992 gave rather convincing results (differering only by 7%). Furthermore, with the right setting of the acoustic instruments the noise has been excluded to a greater extent.

If ACFM is to provide any advice other than for precautionary TACs in the future, several of the problems mentioned above have to be resolved.

A.1 *Sebastes mentella* "oceanic type" in Sub-areas XII and XIV

Source of information: Report of the North-Western Working Group, May 1993 (C.M.1993/Assess:18).

Year	1986	1987	1988	1989	1990	1991	1992	1993	Max[1]	Min[1]	Mean[1]
Recommended TAC	-	-	-	-	-	66	-[2]	~50			
Agreed TAC	-	-	-	-	-	-					
Landings as used by ACFM, total	105	91	91	38	32	23	56	-	105	23	63
Division Va	-	-	-	-	-	-	1	-	1	-	1
Sub-area XII	24	3	10	17	7	7	10	-	61	3	23
Sub-area XIV	81	88	82	21	25	16	45	-	88	+	34

[1]Over period 1982-1992. [2]Preference for no major expansion of fishery. Weights in '000 t.

Catches: The fishery started in 1982. Landings increased from 1984 to 1986 and subsequently declined since then until 1992 when they increased again.

Data and assessment: No analytical assessment is available due to age reading problems. Effort series are available for two fleets. Comparable acoustic estimates are available for a given area from 1991 and 1992.

Fishing mortality: No information available.

Recruitment: No estimates available.

State of stock: Due to uncertainties regarding this stock ACFM carried out simulations with various input parameters in order to examine the possible response of this stock to fishing. The 1992 Icelandic acoustic survey estimated a stock biomass of 1.3 million t in the area surveyed by Iceland. In an area not covered by the Icelandic survey but covered at the same time by Russia, a biomass of 630,000 t was estimated, giving a total estimate of 1.9 million t in the area covered in the two surveys.

Management advice: The simulations indicate that a TAC of over 150,000 t may reduce the stock to low levels during the next 10 years. A TAC of about 100,000 t for the next 10 years will result in less than 50% reduction from the virgin (1982) biomass level under the most likely scenarios.

Special comments: Due to the uncertainties regarding this stock, it is essential that it be monitored regularly (e.g. every third year) using acoustic surveys.

B Blue Whiting

B.1 General Comments

The present separation of blue whiting into two stocks (Northern and Southern) is based more on convenience than on scientific evidence. Whether there exist one, two or more populations in this area, their geographic distribution is not clear and their distribution may also change over time. A recent study gave no indication of genetic substructure among blue whiting from the Norwegian Sea to Gibraltar. ACFM will therefore, if possible, assess the northern and southern

stocks as one unit in the future.

B.2 Blue Whiting in the Northern Area (Sub-areas I-VI and XIV and Divisions VIIb,c)

(Tables 6.4.2.1 - 6.4.2.4)

Source of information: Report of the Blue Whiting Assessment Working Group (C.M.1994/Assess:4).

Year	1986	1987	1988	1989	1990	1991	1992	1993	Max[1]	Min[1]	Mean[1]
Recommended TAC	1000	950	832	630	600	670	-	490[3]			
Agreed TAC	-	-	-	-	-	-	-	-			
Catch as used by ACFM	794	632	523	592	529	339	446	448[2]	1092	238	655

[1]Over period 1977-1992. [2]Estimated. [3]Catch at *status quo* F. Weights in '000 t.

Catches: The fishery was fully established in 1977. A maximum in landings in 1979/1980, and a lesser peak in 1986. A notable drop occurred in 1991 partly due to reduced effort. Recommended TAC not reached in any year.

Data and assessment: Analytical assessment using catch-in-number data and acoustic survey results. Tuning based on acoustic survey of spawning area. Assessment not reliable due to inconsistencies in catch-at-age data and conflicting trends between acoustic estimates and analysis based on catch data.

Fishing mortality: Not known precisely.

Recruitment: The 1989 year class is strong and at the same strength as the 1982/1983 year classes. The 1990-1993 year classes are below average size.

State of stock: Acoustic data suggest that the stock had decreased from a peak level in 1988, but the decline halted in 1992 and the stock is now increasing due to the strong 1989 year class.

Forecast for 1994: Not available.

Management advice: ACFM considers that the trend in the acoustic time series reflects the stock development and the stock appears to be within safe biological limits. If a TAC is to be set a precautionary TAC of 485,000 t, being the mean over the period 1988-1992, seems appropriate.

Special comments: ACFM considers that the acoustic methodology has stabilized and that the estimates reflect the trend in the stock. There are, however, still large uncertainties in the actual level of the stock, and the estimates cannot be taken as absolute values.

B.3 Medium-term prediction requested by NEAFC

ACFM is not in a position to perform a medium-term projection for the stock of blue whiting as the assessment does not allow a reliable estimate of the present level of the stock to be used as a starting point for the prediction. The reasons are given in Section 6.4.1 and in the Special comments above.

C. Norwegian spring-spawning herring

Source of information: Report of the Atlanto-Scandian Herring and Capelin Working Group, October 1993 (C.M.1994/Assess:6).

Year	1986	1987	1988	1989	1990	1991	1992	1993	Max[1]	Min[1]	Mean[1]
Recommended TAC	150	150	120-150	100	80	0	0	119			
Agreed TAC	126	115	120	100	80	76	98	200			
Official landings	127	113	125	94	78	80	99	-			
Catch as used by ACFM	225	127	135	104	86	85	104	-	1995	7	534
Sp. stock biomass	381	749	2200	2630	2576	2673	2396	2359[2]	11188	9	2840
Recruitment (age 3)	16694	467	603	52	343	2008	6107	8298[3]	50672	4	3575
Mean F(5 - 9,u)	0.7	0.3	0.3	0.05	0.04	0.04	0.04	-	2.24	0.01	0.31

[1]Over period 1950-1992. [2]Forward projection. [3]Estimate from survey. Weights in '000 t, recruitment in millions.

Catches: Increased to 1986, then decreased to 1991. Catches increasing 1992-1993.

Data and assessment: Assessment tuned to tagging and acoustic estimates. Stock data for the period 1952-1972 are uncertain and are provided here to show the development of the stock over the long term.

Fishing mortality: Has been at a very low level in recent years.

Recruitment: Increasing in the most recent years.

State of stock: This stock has recovered from its depleted state in the 1970s and 1980s. The spawning stock in 1994 will be above the minimum biologically acceptable level.

Forecast for 1994: Assuming F(93) = 0.09, Basis: TAC, Catch(93) = 205, Landings (93) = 200.

Option	Basis	F(94)	SSB(94)	Catch(94)	Lndgs(94)	SSB(95)	Consequences/implications
A	No fishing	0	2788	0	0	4017	Increasing SSB.
B	F(94) = 0.5 x F(93)	0.04	2777	120	115	3891	Increasing SSB.
C	F(94) = F(93)	0.09	2766	236	231	3772	Increasing SSB.
D	Gradual increase	0.13	2756	334	329	3660	Increasing SSB.
E	F(94) = 2xF(93)	0.18	2744	455	450	3562	Increasing SSB.

Weights in '000 t.

Continued fishing at current levels of fishing mortality will lead to an increase in SSB in the coming 2 years, however, still below the MSY level. Management advice: In 1994, this stock is expected to be above the Minimum Biologically Acceptable Level (MBAL). If a development in the fishery is required, ACFM advises that any increase in fishing mortality should be gradual.

Special comments:

1. A long-term target fishing mortality of $F_{0.1}$ would result in an efficient utilisation of this stock. $F_{0.1}$ has historically been estimated about 0.26. To allow for an orderly development of the fishery and at the same time obtain estimates of the present level of $F_{0.1}$, fishing mortality could be increased gradually towards this level. This could be obtained by

applying a fishing mortality of 0.13 in 1994, corresponding to a catch of 334,000 t in 1994. This stock represents a special situation which is not entirely covered by the present form of ACFM advice. The advice given is based on an adaptive management approach which is to be evaluated further in relation to future developments of the form of ACFM advice.

2. The spawning stock is still below the level known to have given good recruitment in the period prior to the collapse of the stock, and is still very much below the historic level in the 1950s (about 7-10 million t). Although the SSB is predicted to increase above 2.5 million t in 1994, this assessment must be considered uncertain due to difficulties in the interpretation of the surveys on which the assessment are based, and to increased natural mortality caused by the *Ichthyophonus hoferi* disease. Furthermore, as the natural mortality in 1991-1992 is estimated to be 4-5 times the fishing mortality, the analytical assessment can only be used to estimate the relative year-class strength.

The acoustic and O-group surveys in the Barents Sea in recent years indicate the recruitment to the herring stock to be good in the coming years. The uncertainties in the further development of the cod-capelin and herring system in the Barents Sea, however, makes it extremely difficult to predict the recruitment to this herring stock in the near future.

Information on *Ichthyophonus hoferi*

Samples of Norwegian spring-spawning herring taken in 1993 revealed variable but significant infestation of *Ichthyophonus hoferi*. In the wintering areas in January infection rates of 6.7% were observed in 1993, as compared to 1-2% in January 1992. Of the infected fish 75% belonged to the 1983 year class. Later when most of the pre-spawning fish had left the wintering area the infestation rate increased to 60-70%. Herring sampled by trawl generally exhibit higher infection rates compared to samples obtained by purse seine. Samples taken off northern Norway (Malangen Bank) in January 1993, mainly of the 1989 year class, indicated an infestation rate of 64%, and in February, 82% from three samples on the spawning grounds were infected.

Information on the Spatial and Temporal Distribution of Norwegian Spring-Spawning Herring

The general distribution pattern of the Norwegian spring-spawning herring in 1992-1993 is shown in Figure 2.9.2.2. Since 1989 a gradual southward extension of the spawning grounds has been observed, and in 1993 as in 1992 spawning was recorded at Egersund and Siragrunnen. In February 1993, a few specimens of maturing spring-spawning herring were caught in the old spawning areas east of the Faroes.

The feeding areas for the adult stock are in the Norwegian Sea and have gradually been extended in recent years. In June-July 1993 herring were found distributed in very scattered concentrations over wide areas in the Norwegian Sea. Compared to 1992 the distribution in 1993 appeared to be over a wider area both to the north and south.

Since 1986/1987 the wintering areas have been in the fjords of northern Norway between 67° and 69° N.

Since 1988 the most important nursery areas have been in the Barents Sea. In 1993, for the first time since the 1950s, O-group herring were observed in the Norwegian Sea (east of Jan Mayen).

D. Description of Deep-Water Fisheries South of 63°N

ACFM has begun the task of compiling the data required to provide a description of the fisheries for deep-water species in the area south of 63°N. This subject will be addressed by a Study Group established for this purpose in 1994, and a report will be provided at the ACFM Meeting in October - November 1994.

Annex 3

ICES Resolution

2:6:20 A Study Group on the Biology and Assessment of Deep-Sea Fisheries Resources will be established under the chairmanship of Mr B. Jones (UK) and will meet at ICES Headquarters from 24-30 August 1994 to:

a) describe the fisheries for deep-water species (e.g., orange roughy, anglerfish, grenadiers, scabbard fish, rabbit fish (Chimaerids), forkbeards, sharks, Moridae) in the ICES area, and summarize all available information on catches and fishing effort by species, fleets, and gear;

b) report on the existing biological data for the deep-water species, and describe the biology of these stocks;

c) advise on additions to the list of species for which national catch data are required;

d) report on possible methods of assessment for these stocks, provide an inventory of the data available for assessment purposes, and identify shortcomings and data requirements;

e) assess the need for future international collaborative research activity and data collection programs on the biology and assessment of deep-water stocks in the ICES area and recommend appropriate plans;

f) identify species or stocks, if any, which may already be subject to excessive or unsustainable exploitation and suggest appropriate management actions.

APPENDIX L

INDO-PACIFIC TUNA PROGRAMME

Requirements for High Seas Fishery Statistics

IPTP has been operational since 1982. It is composed of two projects, one initially funded by UNDP and now from member country contributions, the other funded by a trust fund provided by Japan. Its area of competence currently covers the Indian Ocean (FAO Areas 51 and 57), as well as the western Pacific countries of Southeast Asia (part of FAO Area 71). Its objectives are to:

1) provide fisheries scientists and administrators of the countries involved in fishing tuna and tuna-like species in the Indian Ocean and Pacific off Southeast Asia with data on this operation (i.e., on fishing effort, catches and their size composition) as a scientific basis for rational fisheries development and management (i.e. data collection, processing and distribution);

2) provide fisheries scientists and administrators of the countries involved in fishing tuna and tuna-like species in the Indian Ocean, especially developing countries, with scientific information required for addressing fisheries development and management problems identified by them as most needed (i.e. data analysis and distribution);

3) participate in the coordination of activities related to the development and management of tuna and tuna-like species in the Indian Ocean and the Pacific off Southeast Asia.

The activities of the complementary project, Cooperative Investigations on Indian Ocean Tuna Resources are to:

1) analyze the data available to IPTP with a view to determining the status of stocks, giving priority to stocks which are of major importance to the countries exploiting them and where there may be interactions either between fisheries within the country, or between countries, and associating where possible scientists from the countries concerned in the analyses;

2) where additional data are needed or data sets are found to be inadequate, initiate or modify sampling schemes accordingly;

3) review information on the distribution and abundance of tuna and tuna-like species in relation to seasonality and migration patterns;

4) conduct pilot activities to determine the feasibility of tagging tuna in selected areas of the Indian Ocean using local commercial fishing vessels on an opportunistic basis; and

5) support biological studies on tuna, including identification of juvenile stages, studies on age, growth, feeding and reproduction.

Fishery Description

Catches in the zone of competence of IPTP are now of the order of 1.5 million tonnes of tunas, although no data are available for distant water fishing fleets (DWFF) in Area 71. The Indian Ocean catches are of over 800,000 tonnes, 68% of which are from coastal country fisheries. This situation has been evolving rapidly, however, as the purse seine fishery evolved in the last ten years. DWFF longline fleets have also been increasing rapidly, particularly in the eastern Indian Ocean and the Arabian Sea. Many of these vessels are small (less than 50 GT) and these, as well as larger vessels operating in joint venture situations with coastal countries, have not been reporting catches. A further development is that fishing craft from the artisanal fisheries of coastal countries are now venturing considerable distances offshore. The catches of these boats are covered by landing statistics, but there is no record of location of catches.

Data currently collected, processed and stored by IPTP

The primary source of data for IPTP is flag state reporting through liaison officers from the coastal countries in its area of competence and distant water fishing nations exploiting tuna resources in the Indian Ocean only[1/]. Some DWFN statistics are derived from alternative sources such as transhipments or data provided under access agreements to coastal countries. Data are checked with other published sources of information and raising factors may be derived from sampling schemes conducted by the countries concerned, in some cases with IPTP support.

The data collected on a routine basis by IPTP include:

Nominal catches of tuna and tuna-like fish by country, FAO fishing area, species and gear;

Catch and effort data by month, species, gear and fishing ground (1° x 1° or 5° x 5°) by fleet or national catches;

Length-frequency data by species, gear, fishing ground and month, raised to fleet or national catch;

Transhipments made in Indian Ocean countries by foreign vessels; and

Fishing craft statistics.

Although IPTP has been in activity since 1982, some data sets go back to 1954 when industrial longlining started in the Indian Ocean. Data exist for the catches of Australia, Bahrain, Bangladesh, Cayman Islands[2], China (Taiwan), Comoros, Djibouti, Egypt, France, India, Indonesia, Iran, Ivory Coast, Japan, Kenya, Korea, Kuwait, Madagascar, Malaysia, Maldives, Malta[2], Mauritius, Mozambique, Oman, Pakistan, Panama[2/], Philippines, Qatar, Saudi Arabia, Seychelles, South Africa, Spain, Sri Lanka, Tanzania, Thailand, United Arab Emirates, United Kingdom, USSR/Russia and Yemen. Some of these data sets for non-coastal countries cover only a few years during which vessels of these countries were active in the Indian Ocean.

IPTP has no DWFN data for FAO Area 71.

For purse seiners only, from transhipment information.

From the IPTP database, high seas catches can only be distinguished from catches made in EEZs through the catch and effort database. The most common area grid, however, is 5° square, and a fine level of discrimination between high seas and EEZ catches is not possible. Furthermore, the statistical systems of most riparian countries were originally designed for coastal fisheries and do not collect information on the location of catches, despite the fact that many vessels now exploit fishing grounds far from their home bases. For the small longliners and offshore artisanal craft, it would be necessary to introduce logbook reporting, which is likely to be both difficult and costly, even if a legal regime can be found to cover this requirement.

Country status of the Catch and Effort IPTP Database
(IPTP member countries in bold)

Country	1989	1990	1991
China (Taiwan)	X	X	X
France	X	X	X
Indonesia	S	S	S
Japan	X		
Malaysia	S	S	S
Maldives	X	X	X
Mauritius		X	X
Oman		X	
Pakistan	S	S	S
Russia	X	X	X
Spain	X	X	X
Sri Lanka	S	S	S
Thailand	X	X	X

X = Data available
S = Data obtained from IPTP sampling scheme

Known gaps in tuna catch data are mainly due to longline vessels which do not report to their national fisheries administrations or which have re-flagged in countries which do not report to IPTP.

The first case involves China (Taiwan) vessels of less than 50 GT, several hundred of which are now operating in the Indian Ocean[1/]. Some longliners also operate under "joint venture" arrangements and report neither to the host, nor to the flag country. It is hoped to cover catches of re-flagged vessels through transhipment data.

1/ Some transhipment bases are covered by national or IPTP sampling programmes.

Nominal catch and fishing craft data are published annually, with a time lag of about 15 months. Catch-and-effort and length-frequency data are supplied on request, usually in the form of ASCII files on MS-DOS diskettes. No restrictions are applied at this time for the supply of data although there have been discussions on the need to restrict distribution or aggregate length-frequency data sets if this is requested by the originators of the data.

The databases are kept on networked PCs. Software in use for data manipulation and analysis includes FoxBase, dBase, Excel, Improv, SPSS, MathCad, FORTRAN and BASIC.

Cost implications for the collection of high-seas data

Where accurate data are supplied by the flag state, the cost implication to IPTP of collecting data on high seas fisheries, in addition to those covering waters under national jurisdiction, is negligible[1/]. The direct cost of IPTP-supported sampling schemes has averaged $45,000 annually in recent years. This sum could increase as coastal country fisheries move further afield and to cover the influx of small DWFN longliners. A further direct cost comes from the need to update the statistical systems of coastal countries. This can be assessed at about $120,000 annually. If logbook systems are introduced to coastal country fisheries, the cost implications could be very high and could take a considerable time as the literacy and navigational skills of many of the artisanal fishermen are thought to be minimal, and a whole new tier of statistical collection and processing would have to be introduced in national administrations.

Finally, the collection of transhipment data could be considered as a response needed to cover non-reporting. Again, the major cost accrues to the countries supplying the data. The cost to IPTP includes data verification to eliminate double reporting and input.

Fundamentally, however, in the mandate of IPTP, the collection of high-seas data is inextricable from that of catches in waters under national jurisdiction. The data collection, processing and verification activities of IPTP, excluding data analysis, thus cost about $525,000 annually. Over the next biennium, personnel and travel costs will average 79% of this, meetings 16%, equipment 2% and operational costs 3%.

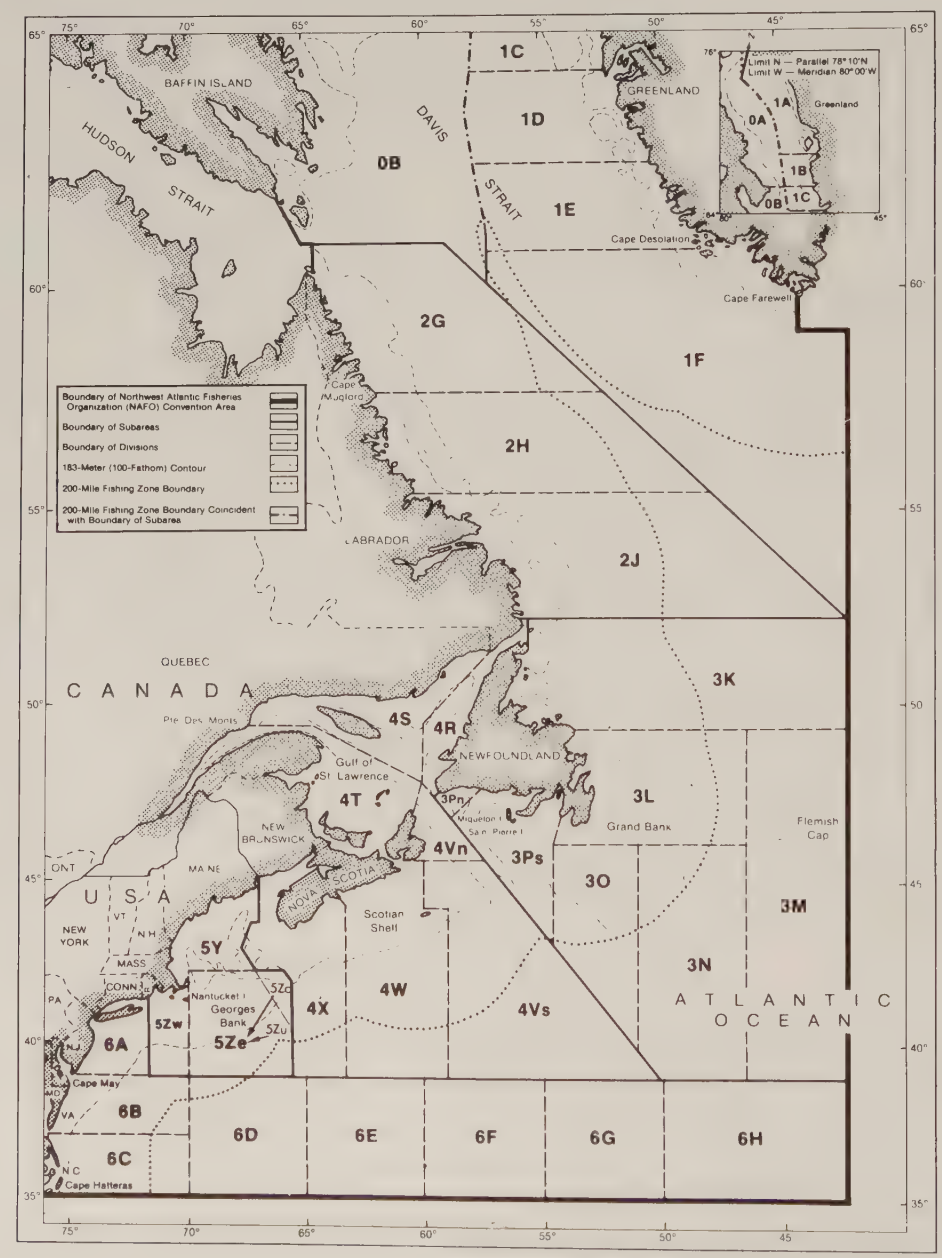
1/ For the flag state, the cost can be substantial, as logbook data need to be collected and processed.

APPENDIX M

NORTHWEST ATLANTIC FISHERIES ORGANIZATION

MAP of the Convention Area

The Convention Area comprises the waters of the Northwest Atlantic Ocean north of 35°00'N latitude and west of line extending due north from 35°00'N latitude and 42°00'W longitude to 59°00'N latitude, thence due west to 44°00'W longitude, and thence due north to the cost of Greenland, and the waters of the Gulf of St. Lawrence, Davis Strait and Baffin Bay south of 78°10'N (Article I, NAFO Convention).



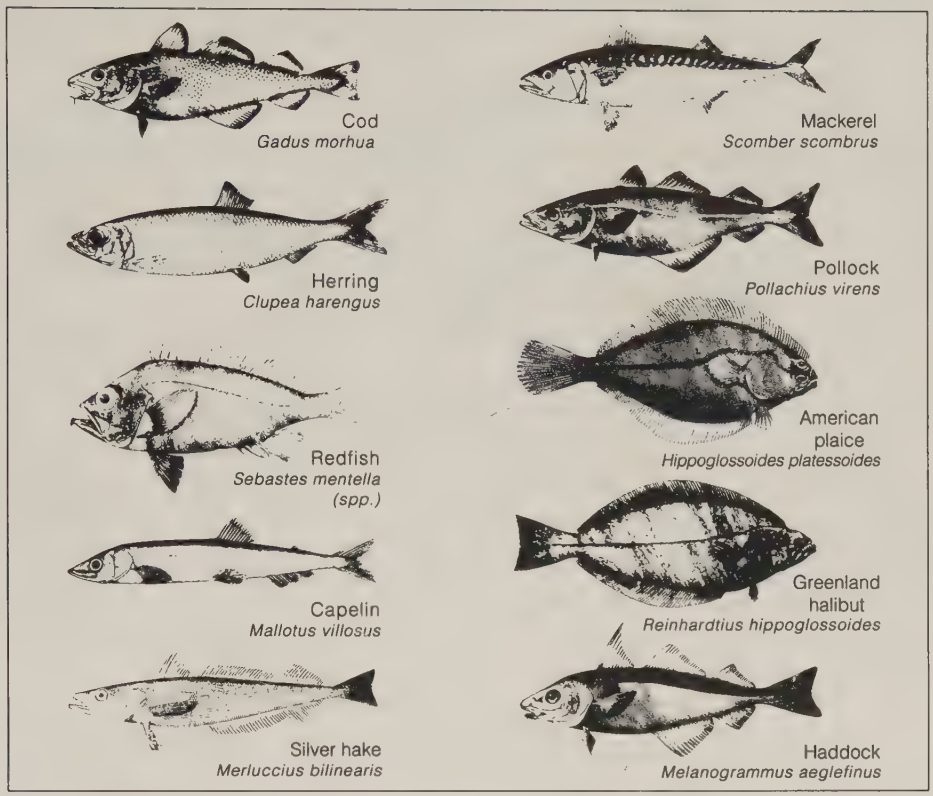
The Regulatory Area is the part of the Convention Area which lies beyond the area in which Coastal States exercise fisheries jurisdiction.

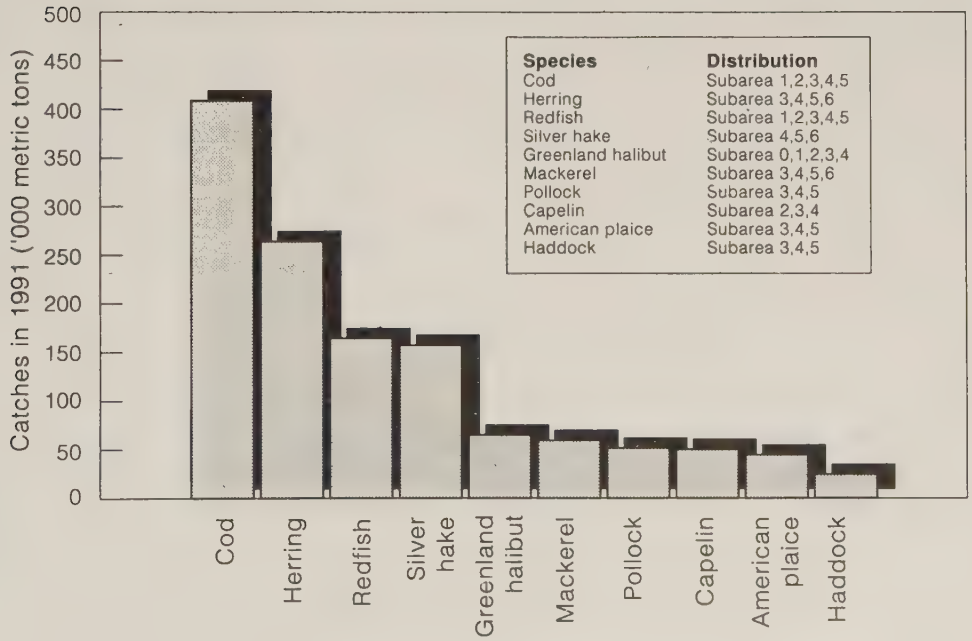
Coastal State means a Contracting Party exercising fisheries jurisdiction in waters forming part of the Convention Area.

Fishery Resources

The Convention applies to all fishery resources of the Convention Area, with the following exceptions: salmon, tunas and marlins, cetacean stocks managed by the International Whaling Commission or any successor organization, and sedentary species of the Continental Shelf..." (Article I, NAFO Convention).

Ten Major Species of the NAFO Convention Area





Introduction

The International Convention for the Northwest Atlantic Fisheries entered into force on 3 July 1950 after the deposit of instruments of ratification by four signatory Governments, namely: Canada, Iceland, United Kingdom, and United States of America. The membership of ICNAF increased during 1950-79 to 18 countries, namely: Bulgaria, Canada, Cuba, Denmark, France, Federal Republic of Germany, German Democratic Republic, Iceland, Italy, Japan, Norway, Poland, Portugal, Romania, Spain, Union of Soviet Socialist Republics, United Kingdom, and United States of America. "This is the first instance wherein a group of nations have formally committed themselves to a program of scientific investigation and regulation, to the end that fish resources of a vast area of the high seas shall be conserved and utilized prudently...." (J. E. Webb, Under Secretary of State, USA at the First Plenary Session ICNAF, 3 April, 1951, Washington). Many initiatives for the management and conservation of fish resources were developed by ICNAF including international quota regulations and national allocations; setting quotas on a precautionary basis to allow rebuilding of stocks; developing fisheries science methods and comprehensive statistics; making proposals for international measures of control on the high seas.

After almost 30 years of activity, ICNAF was replaced by a new Convention. Following the extension of the jurisdiction over the living resources to limits of up to 200 miles by the Coastal States of the Northwest Atlantic, on 24 October 1978 in Ottawa, Canada, eight Parties signed a new Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries. NAFO came into force on 1 January 1979, and there are at present 14 Contracting Parties: Bulgaria, Canada, Cuba Denmark/Greenland, Estonia, European Economic Community, Iceland, Japan, Latvia, Lithuania, Norway, Poland, Romania and the Russian Federation. The primary objective of NAFO is to contribute through consultation and cooperation to the optimum utilization, rational management and conservation of the fishery resources of the Convention Area and to promote to this end scientific research and cooperation.

Facing contemporary challenges to the conservation and optimum utilization of the fishery resources in the Northwest Atlantic Ocean, the Contracting Parties to the Convention have continued to search for new initiatives that can express the needs of all Parties concerned. Since 1990 alone, NAFO has enacted measures including a Hail System and air surveillance for improvements to inspection and control in the Regulatory Area, and established a new Standing Committee on Fishing Activities of non-Contracting Parties in the Regulatory Area which is designated to resolve the problem of unregulated fishing in the area. NAFO management decisions constitute good dialogue with fishery science, which is represented by one of the three constituent bodies of NAFO; the Scientific Council. With respect to statistics, pursuant of Article VI.16 of the Convention, a function of the Scientific Council shall be to compile and maintain statistics and records and to publish or disseminate reports, information and materials pertaining to the fisheries of the Convention Area, including environmental and ecological factors affecting these fisheries; and Article VI.3, the Contracting Parties shall furnish to the Scientific Council any available statistical and scientific information requested by the Council for the purpose of this Article. The Fisheries Commission, a constituent body of NAFO, is responsible for the management and conservation of the fishery resources of the Regulatory Area. The Commission and Coastal States are provided information and advice by the Scientific Council. Figure 1 depicts the structure and responsibilities of NAFO constituent bodies. The object of the Organization is to contribute through consultation and cooperation to the optimum utilization, rational management and conservation of the fishery resources of the Convention Area (Article II, NAFO Convention).

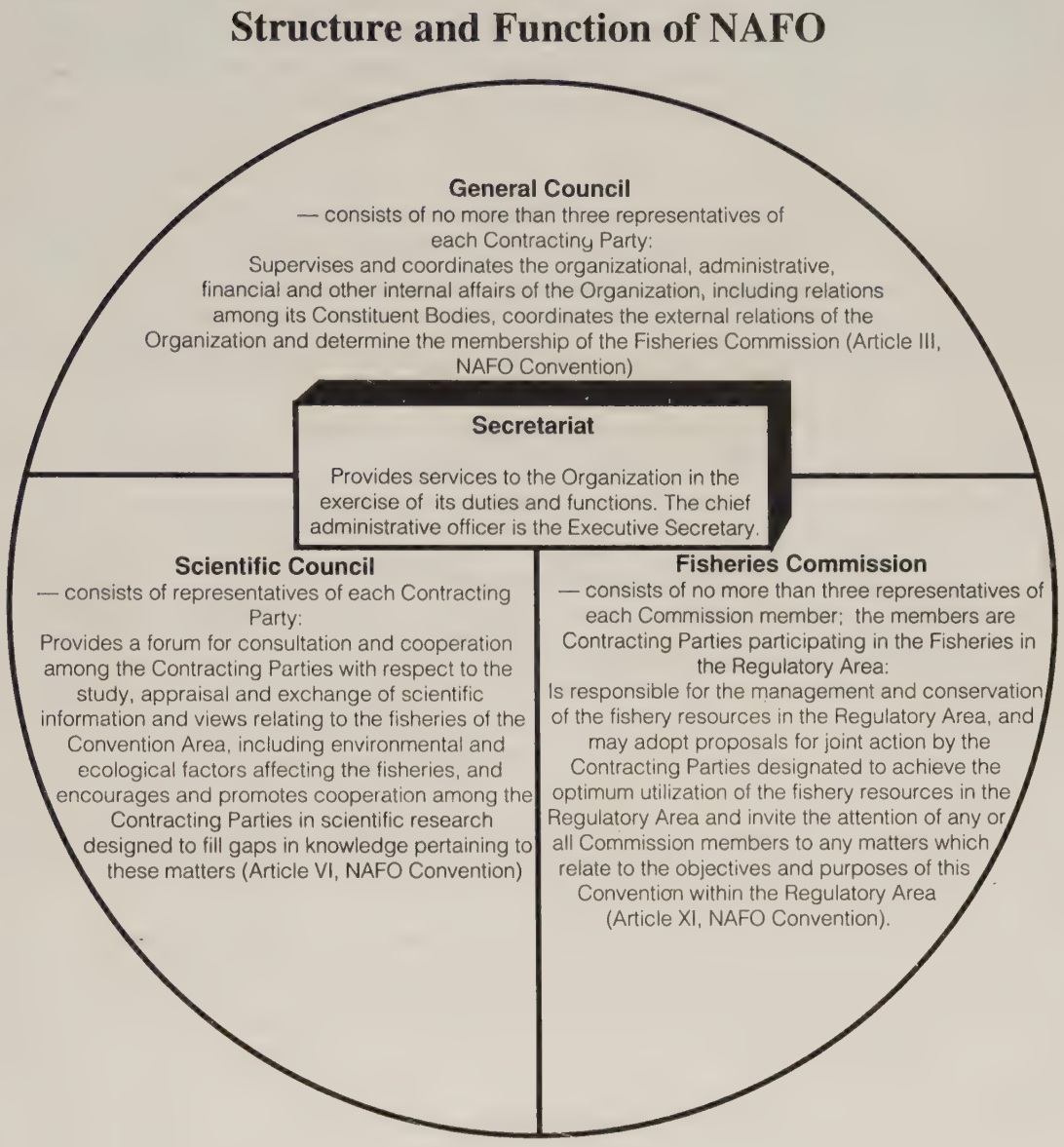

Structure and Function of NAFO
General Council
— consists of no more than three representatives of each Contracting Party:
Supervises and coordinates the organizational, administrative, financial and other internal affairs of the Organization, including relations among its Constituent Bodies, coordinates the external relations of the Organization and determine the membership of the Fisheries Commission (Article III, NAFO Convention)
Secretariat
Provides services to the Organization in the exercise of its duties and functions. The chief administrative officer is the Executive Secretary.
Scientific Council
— consists of representatives of each Contracting Party:
Provides a forum for consultation and cooperation among the Contracting Parties with respect to the study, appraisal and exchange of scientific information and views relating to the fisheries of the Convention Area, including environmental and ecological factors affecting the fisheries, and encourages and promotes cooperation among the Contracting Parties in scientific research designed to fill gaps in knowledge pertaining to these matters (Article VI, NAFO Convention)
Fisheries Commission
— consists of no more than three representatives of each Commission member; the members are Contracting Parties participating in the Fisheries in the Regulatory Area:
Is responsible for the management and conservation of the fishery resources in the Regulatory Area, and may adopt proposals for joint action by the Contracting Parties designated to achieve the optimum utilization of the fishery resources in the Regulatory Area and invite the attention of any or all Commission members to any matters which relate to the objectives and purposes of this Convention within the Regulatory Area (Article XI, NAFO Convention).

Fig. 1. Schematic diagram of the structure and function of NAFO.

Data Currently Used

a) The primary source of statistics used by the Scientific Council

Data requirements for scientific evaluation of the status of stocks have evolved through the ICNAF and NAFO history. In the 1960s, the STANA data reporting forms were developed by ICNAF, FAO and the predecessor to the CWP. In the early-1970s, the STATLANT 21A and 21B forms replaced the STANA forms, and these forms evolved gradually as different needs arose. The 21A and 21B forms currently used represent the most important data sources for stock evaluations.

STATLANT 21A Forms: Scientific Council Rules of Procedure requires that Contracting Parties submit these data before 15 May. This is in order to provide catch data of the previous calender year in time for the June Meeting of the Scientific Council, when stock assessments are carried out. These data which are considered preliminary constitute: nominal catches (live weight equivalent of landings in metric tons) of national flag vessels reported by Subareas, Divisions and Subdivisions of the Convention Area. Chartered or joint venture activities are identified.

The data are tabulated by the Secretariat and circulated in the series NAFO Summary Documents (SCS Doc.). The SCS Documents include:

i) "Provisional Nominal Catches in the Northwest Atlantic, (of previous years)",

- with Tables
  - Nominal catches by Species and Subarea (2 most recent years).
  - Nominal catches by Species Groups by Division and Country.
  - Nominal catches by Individual Species by Division and Country.
  - Joint venture catches by Country.

ii) "Historical Catches of Selected Species by Stock Area and Country for the Period (last 10 years)".

iii) "Notes on Statistical Activities since (previous June)".

STATLANT 21B Forms: The Scientific Council Rules of Procedure requires that Contracting Parties submit their final catch and effort data in STATLANT 21B form before 30 June.

Annual fishery statistics of nominal catches and fishing effort (21B data) for the Northwest Atlantic (FAO Major Fishing Area 21) had been published by ICNAF in the ICNAF Statistical Bulletin between 1951 and 1978. As a result of the replacement of ICNAF by NAFO in 1979, ICNAF Statistical Bulletin Volume 28 for 1978 statistics was followed by the first issue of NAFO Statistical Bulletin which was numbered Volume 29 and contained fishery statistics for 1979. Publication of the Bulletin by the Secretariat has continued under the aegis of NAFO, where annual fishery statistics are presented of commercial nominal catches from the marine finfish, invertebrate and seaweed resources of the NAFO Convention Area (Subareas 0 to 6).

This issue contains the most recent year of data available (the most recent is Volume 40 for 1990 data) to the Secretariat. The data are derived from STATLANT 21B reports by countries which are subject to the Regulations of NAFO and by non-member states, which reported fishing operations in the Northwest Atlantic. Data on quantities of fish and invertebrates are presented as "nominal catches" (i.e. live weight equivalent of the landings) in metric tons, and data for seaweeds are given as wet weight in metric tons. Catches of seals are given as numbers of animals. The statistics are presented on a calendar year basis and by month, where applicable. The tabular material of all statistical data are prepared directly from computer compilations, utilizing the Secretariat's own IBM Compatible PC-NEC 386 with a Panasonic KX-P4410 Laser Partner and printed at the Secretariat.

The following tabulations are presented in the Statistical Bulletin.

i) Summary of Nominal Catches of Most Recent 15 years.

ii) Fishery Statistics (for the most recent year available) in respect of:

- Nominal Catches by Species and Subarea.
- Nominal Catches for Species Groups by Division and Country.
- Nominal Catches of Individual Species by Division and Country.
- Nominal Catches of Selected Species by Division, Country and Month.
- Nominal Catches and Fishing Effort by Division, Country, Gear, Tonnage Class, Main Species and Month.
- Nominal Catches and Effort Statistics for Countries Where Vessels Fished Under Cooperative Arrangements with Coastal States.

iii) Seal Statistics (for the most recent year available) for:

- Harp and Hooded Seal Catches
- Seal Hunting Effort

b) Additional Statistics Used by the Scientific Council

Biological Sampling Data: The Sampling Yearbook containing length frequencies and age-length keys for many of the Northwest Atlantic commercial fish species was first published by ICNAF in 1958. The annual publication continued covering data for the years 1955 to 1972 in Volumes 1 to 17. As a result of a considerable increase in the volume of data, the publication of actual sampling data was then discontinued and the ICNAF Sampling Yearbook for the years 1973 to 1978 contained only lists of data available at the ICNAF Secretariat. Similar lists were subsequently prepared for the years 1967 to 1972.

Sampling data for 1979 and subsequent years were collected under the aegis of NAFO and provisional annual inventories were compiled in the NAFO Summary Documents (SCS Doc.) series for use by the Scientific Council.

Recognizing that the sampling data were extensively used as a primary guide to a time series by scientists in the assessments of stocks, the NAFO Scientific Council in 1984 agreed that the lists of sampling data for the period from 1967 to 1978 should be updated and published in a single volume titled Inventory of Sampling Data, 1967-1978 to distinguish it from the earlier ICNAF Sampling Yearbook series.

Based on the Scientific Council decisions, the Inventory of Sampling Data, 1979-1984 and 1986-1989 have been published.

The tabulations contain the following data:

- Year, species, country, NAFO Division, gear, month, type of sample, no. length samples and no. age samples. NAFO scientists are able to access the data through the Secretariat or by direct contact with the national laboratories.

List of Fishing Vessels: ICNAF in June 1954 recommended that countries supply, every three years, a list of their vessels fishing in the Convention Area. Data available to the Secretariat for 1952-54 were first listed in 1955 (ICNAF Doc.) and the 'List of Vessels of over 50 gross tons fishing in the ICNAF Convention Area in 1956' was prepared in 1958 (ICNAF Doc.). The ICNAF 'List of Fishing Vessels' was published triennially thereafter until the last ICNAF issue containing data for 1977. The Scientific Council of NAFO, at its first meeting in June 1980, agreed that the publication of the triennial list should be continued, and the first NAFO issue containing data for 1980 was published in March 1983. The most recent issue contains data for 1989.

The data provided for 50-GRT and larger fishing vessels generally include:

- The country name of vessel, date built, gross registered tonnage, total length, engine horsepower, national register number, radio call letters, home port, number in crew, type of fishing gear and subareas fished.

- The contents are set out in two sections, the first containing tabular summaries of fishing vessels statistics for the most recent year available and earlier years, and the second containing tables, arranged by country, of available information on individual fishing vessels.

c) Fishery Monitoring Data

Provisional monthly data: The NAFO Conservation and Enforcement Measures has provided that the annual quota allocations are not exceeded. For this purpose, it is required that a Contracting Party shall, within 30 days following the calendar month in which the catches were made, report provisional monthly catches by species and stock area to the Executive Secretary, whether or not that Party has quota allocations for the stocks form which catches were obtained. The Executive Secretary shall circulate these data every month.

The Executive Secretary shall also collate the logbook catch summaries from inspection forms and, on a monthly basis, circulate the cumulative year-to-date information to Contracting Parties.

These reports of provisional monthly catches do not represent the annual NAFO fisheries statistics that are compiled in accordance with the NAFO Convention. Those statistics forming the

database for the performance of the Scientific Council are furnished by Contracting Parties to the NAFO Secretariat in the STATLANT 21A and 21B forms.

Hail system data: Contracting Parties are required that vessels of that Party to which the Scheme of Joint International Inspection and Surveillance applies would report to their competent authorities: each entry into the Regulatory Area and exit from the Regulatory Area. This report is to be made at least (6) hours in advance of the vessel's entry and prior to the vessel's exit. The report is to include the date, the time and geographical position of the vessel.

These data submissions, at present, are directed toward surveillance and monitoring of fishing activities.

High Seas Fishery Statistics

The description of the data currently collected, processed and stored by NAFO as given above relates to all fishery activities in the Convention Area. While at present there is no separation of data from the part of the Convention Area which lies beyond the area in which Coastal States exercise fisheries jurisdiction (Regulatory Area), the Scientific Council in 1991 agreed the separation would be useful. It was noted that separate data for Coastal State jurisdiction areas would already be recorded in the Coastal State databases. This is not operative in the NAFO database yet.

In accordance with the NAFO Convention it is required that all Contracting Parties furnish the fishery statistics to the NAFO database. In addition, it is noted that some non-Contracting Parties active in the area also submit statistics to NAFO. However, the NAFO monitoring and surveillance systems indicate there are many non-Contracting Parties fishing in the Regulatory Area. In 1992, about 35 non-Contracting Party vessels from more than 10 countries were reported fishing in the area, and were not submitting data.

Recent diplomatic interactions with those countries (through the special Standing Committee of the General Council struck to address the issue) have shown some improvement in compliance to NAFO concerns.

Approximate Costing

In order to provide an overall picture of estimated costs for all statistical information compiled and distributed by the NAFO Secretariat, it was necessary to breakdown into sections.

SECTION A

This section provides cost estimates for the compilation, printing and distribution of the primary statistical information published in Statistical Bulletin, List of Fishing Vessels, Inventory of Sampling Data, Scientific Council Reports, and in addition miscellaneous documents containing such information (700 pages/yr).

The estimate contains a percentage of yearly salaries for five employees in the statistical office and three employees involved with the printing and distribution of the information. NAFO has not installed E-mail yet.

a)	Statistical Office		
	i)	Percentage of salaries for five employees	$ 93 000.00
	ii)	Supplies (paper, toner, discs, etc.)	400.00
b)	Printing, Collating and Binding		
	i)	Percentage of salaries for two employees	$ 6 500.00
	ii)	Paper, cover stock, binding of publications and supplies	3 000.00
c)	Mailing, Postage and Handling		
	i)	Percentage of salary for one employee	$ 800.00
	ii)	Envelopes and postage	5 500.00
	TOTAL		$ 109 300.00

SECTION B

This section provides cost estimates for compilation and distribution of the Hail System statistics. It includes a percentage of yearly salaries, maintenance and network access, noting computer networking has not been installed at NAFO.

a)	Compilation		
	i)	Percentage of salaries for four employees	$ 35 000.00
	ii)	Maintenance and supplies for network (telex and telefax)	2 300.00
b)	Distribution		
	i)	Cost of transmitting messages on telex and telefax	12 700.00
	TOTAL		$ 50 000.00

SECTION C

Average travel expenses related to statistics	$ 5 000.00
TOTAL	$ 5 000.00

SECTION D

This section provides cost estimates for additional presentations of statistics as published in the Journal, Studies, Annual Reports and Meeting Proceedings.

The estimate includes a percentage of yearly salaries for seven employees, supplies and distribution.

a)	Editing, Typing and Layout		
	i)	Percentage of yearly salaries for five employees	$ 11 500.00
	ii)	Supplies (discs, paper, toner, etc.)	1 000.00
b)	Printing, Collating and Binding		
	i)	Percentage of yearly salaries for two employees	$ 1 000.00
	ii)	Paper, cover stock and binding	500.00
c)	Mailing, Postage and Handling		
		Percentage of salary for one employee, envelopes, postage and handling	$ 300.00
		TOTAL	$ 14 300.00

SECTION E

This section provides cost estimates for a percentage of the time equipment in the Secretariat is used for statistical purposes.

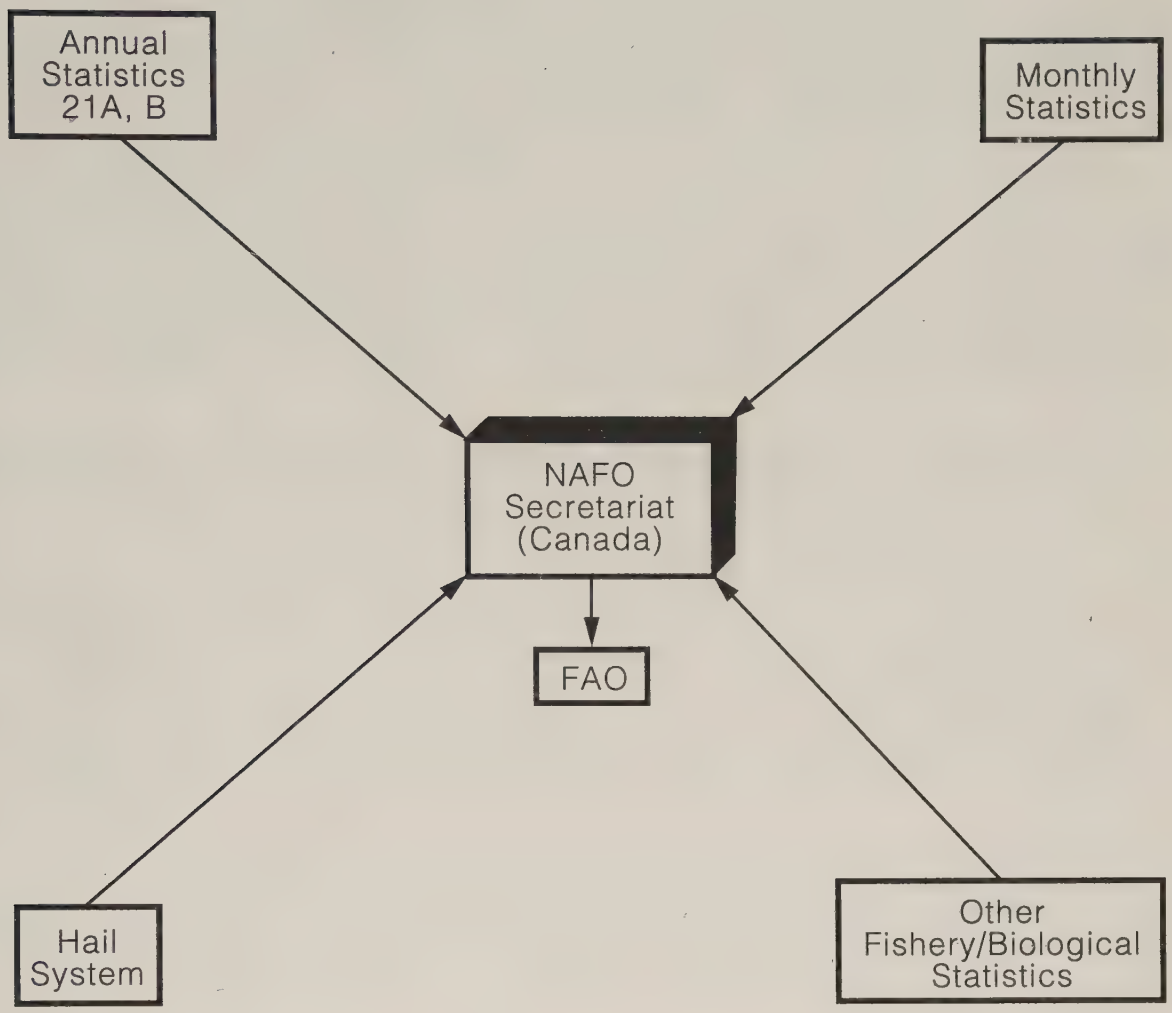
The estimate includes PC computers and printers, scanner, 2 printing presses, collator, stitcher camera, master imager, telex machine, telefax machine, mailing machine and maintenance agreements on some of the equipment.

TOTAL	$ 30 000.00

SUMMARY

SECTION A	$ 109 300.00
SECTION B	50 000.00
SECTION C	5 000.00
SECTION D	14 300.00
SECTION E	30 000.00
GRAND TOTAL	$ 208 600.00

5. Proposed Future Data Flow



Proposed future data flow

APPENDIX N

SOUTH PACIFIC COMMISSION

Introduction

Recent Catches in the western tropical Pacific Ocean

Tuna fisheries in the western tropical Pacific account for approximately 50 percent of the world catch of skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), bigeye (*Thunnus obesus*) and albacore (*Thunnus alalunga*). An estimated 1.5 million tonnes of these four species were caught in 1991 in the South Pacific Commission statistical area (Figure 1) and in the waters of eastern Indonesia[1/] and the Philippines (Table 1, Figures 2 and 3), compared to the 1991 world catch of 3.0 million tonnes (Food and Agriculture Organization 1993).

The catch in the western tropical Pacific remained stable during 1992, at 1.5 million tonnes, including approximately 961,000 mt of skipjack and 436,000 mt of yellowfin.

Principal Gear Types:

The principal industrial gear types currently catching tuna in the SPC statistical area are longline, pole-and-line, purse seine and troll. During 1992, longliners accounted for 12 per cent of the catch, pole-and-line vessels for 7 per cent, purse seiners for 80 per cent, and trollers for 1 per cent. A driftnet fishery targeting albacore began operating in the SPC region in 1982 and ceased in 1991. Subsistence fisheries for tuna occur throughout the SPC region; however, catches are minor.

The distribution of catches are shown in Figures 4-7 for some of the major fleets. Significant catches are made by all gear types in the areas of international waters within the SPC statistical area.

Fishing Nations:

The tuna fisheries in the SPC region are complex, in that many fishing nations are involved, either coastal states with domestic fleets or distant-water fishing nations (DWFNs) operating under agreements with coastal states and on the high seas. During 1992, 18 fishing nations operated vessels in the region, with fleet size ranging from one to hundreds of vessels (Table 2). The largest coastal state fleets ("domestic" fleets) are operated by Solomon Islands, Fiji and the Federated States of Micronesia, while the principal DWFN fleets are those of Japan, Republic of China (Taiwan), Republic of Korea and the United States.

Catches of Tuna on the High Seas within the SPC Statistical Area:

A rough estimate of tuna catches on the high seas within the SPC statistical area can be obtained by assuming that 25 per cent of pole-and-line and purse catches, and 50 per cent of longline and troll catches, are taken on the high seas. If these proportions are approximately correct, the high seas catch during 1992 was roughly 300,000 mt, or about 30 per cent of the total catch within the SPC statistical area.

1/ Catches in the waters of eastern Indonesia refer to catches in the Pacific Ocean waters of Indonesia.

Tuna Fishery Statistics and Research at the South Pacific Commission

The South Pacific Commission was established in 1947 and currently has as members 27 countries and territories.[1/] The objective of the SPC work programme is to assist with the socio-economic development of the small island countries and territories. The work programme includes the Community Education Training Centre, Community Health Services, the Fisheries Programme, the Food and Materials Programme, the Plant Protection Office, the Regional Media Centre, the Rural Technology Programme, Socio-Economic Statistical Services, the Women's Programme, and the Youth and Adult Education Programme.

The Fisheries Programme constitutes the largest activity within SPC and consists of the Coastal Fisheries Programme and the Tuna and Billfish Assessment Programme. Two projects have been defined within the TBAP: the Fisheries Statistics Project and the Tuna and Billfish Research Project. These projects, while interacting to a large extent, reflect the two basic types of work undertaken by the TBAP:

- the collection, processing and dissemination of fisheries statistics pertaining to tuna and billfish stocks in the region; and

- the conduct of a programme of research on those stocks, particularly in regard to the state of exploitation of the stocks and to interactions between components of the fishery.

Data Requirements

Stock Assessment:

The assessment of skipjack and yellowfin stocks in the western tropical Pacific by the TBAP has relied primarily on the analysis of tagging data (Kleiber et al. 1984, Hampton 1992, Hampton and Lewis 1993). Two large-scale tagging experiments have been conducted by SPC: the Skipjack Survey and Assessment Programme and the Regional Tuna Tagging Project.

The Skipjack Survey and Assessment Programme (SSAP) released more than 140,000 tagged skipjack throughout the SPC region between October 1977 and August 1980. The analysis of over 6,000 tag returns, using a tag attrition model and assuming an average monthly catch during the study period, indicated a large standing stock, with a high annual throughput (the sum of death, emigration and growth from the population vulnerable to fishing). Monthly catch (mt) and effort (boat-days) data that were available for pole-and-line and purse seine fisheries in individual countries were used with the tagging data to estimate harvest rates within each country. The low harvest rates estimated for the study area as a whole, in relation to throughput, indicated that skipjack catches could be increased considerably.

Skipjack and yellowfin catches in the SPC statistical area more than doubled during the 1980s, largely due to the growth of the purse seine fishery. In response to the rapid increase in catches and the consequent need to revise the stock assessment of skipjack and to assess the yellowfin stock, the Regional Tuna Tagging Project (RTTP) was conducted. The RTTP released 146,430

1/ American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Commonwealth of the Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Solomon Islands, Tokelau, Tonga, Tuvalu, United Kingdom, United States of America, Vanuatu, Wallis and Futuna, and Western Samoa

tagged fish from mid-1989 to December 1992.[1/] By November 1993, a total of 17,850 tags had been returned, giving a preliminary recovery rate of 12.2 per cent. Assessments have been carried out with the RTTP tagging data, in conjunction with estimates of monthly catches based on best estimates of annual catches for the calendar years 1989—1992 apportioned equally to months in those years. The results showed that harvest rates for both skipjack and yellowfin in the western tropical Pacific were still low in comparison to throughput, which suggested that catches of both species could be increased even further.

The catch data required for the analyses of tagging data discussed above are monthly estimates for the entire study area for all surface gear types combined. They are neither detailed nor precise, yet they are sufficient to obtain well-determined estimates of the population parameters of interest. Future analyses of the tagging data held at SPC will use models incorporating a finer spatial and temporal structure to examine age and size structure, and movements of fish within the SPC region. These analyses will require catch and effort data of a finer time-area stratification, and length frequency data.

Qualitative assessments of the stocks of the four principal species (albacore, bigeye, skipjack and yellowfin) have been conducted using catch and effort data aggregated by time-area strata (e.g. 1° latitude x 1° longitude by month, or 5° latitude x 5° longitude by month) (e.g. Hampton 1993).

Attempts have been made to standardise yellowfin catch rates, with a view to constructing indices of relative abundance (e.g. Polacheck 1988, Lawson 1993a). The catch and effort data required as input included information at the finest resolution available, i.e. for individual longline or purse seine sets.

Estimation of Annual Catches:

Estimates of annual catches of albacore, bigeye, skipjack and yellowfin in the SPC statistical area and in the waters of eastern Indonesia and the Philippines, are compiled from various sources. Historical catches for domestic fleets are usually estimated from catch and effort logsheet data provided to SPC by members. Historical catches of DWFN fleets are usually estimated from aggregated catch and effort data provided by DWFNs. Recent catches for most domestic and DWFN fleets are compiled from export data, transshipment statistics, and other types of data, which are provided by numerous individuals in SPC member countries and territories, and in DWFNs.

SPC Regional Tuna Bulletin:

Monthly catch and effort statistics are published quarterly in the *SPC Regional Tuna Bulletin*. The input data for the monthly statistics published in the *Tuna Bulletin* are taken from catch and effort logsheets provided by SPC members, covering domestic and DWFN fleets.

Requirements for High Seas Fishery Statistics

High seas fishery statistics are not required explicitly, i.e. as an entity unto themselves, at the South Pacific Commission, for stock assessment, nor for the estimation of annual catches, nor for the *Tuna Bulletin*. The assessments of tropical tunas in the western Pacific have considered the population of fish vulnerable to fishing, without reference to political boundaries. Likewise, annual

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1/ Includes 13,653 releases from the Philippines Tuna Research Project (PRTP), which was conducted by SPC during July—October 1992.

catch estimates, and monthly statistics published in the *Tuna Bulletin*, are compiled for the SPC statistical area, without explicit reference to EEZs or to the high seas.

However, although high seas fishery statistics are not required explicitly, it is implicit that high seas catches are included in the catch statistics used for stock assessment and in the estimates of annual catches, together with catches in EEZs.

From the above, it can be seen that SPC compiles catch statistics of three main types: catch and effort logsheets, provided by SPC members; catch and effort data aggregated by time-area strata, provided by DWFNs; and estimates of recent annual catches, from various sources. The compilation and processing of these types of data at SPC are further examined below.

Catch and Effort Logsheets

Catch and effort logsheets represent the basic source of catch and effort statistics for tuna fisheries in the SPC area. Catch statistics have been published by fishing nations in various levels of aggregation by time-area strata, from annual catches for the whole Pacific Ocean, to catches by 1° latitude x 1° longitude by month. In each case, the basic source of the data has almost always been catch and effort logsheets, which contain information covering the daily fishing activities of individual vessels. For purse seiners, in particular, the level of detail is even finer; the information recorded on purse seine logsheets usually covers each set, rather than each day.

This section discusses the compilation and processing of logsheet data at SPC. It should be noted that logsheets for most DWFN fleets are also processed within their national fisheries statistics systems. The data processed at SPC usually represents a subset of the data processed nationally, i.e. those data covering activities within the EEZs of SPC members, which the DWFNs are required to submit under their access agreements with SPC members. The logsheets processed at SPC have been compared to those processed nationally for the Japanese fleets, Korean purse seiners and American purse seiners. In each case, the data provided to SPC have been found to be virtually identical to the data processed nationally, except for the lack of high seas data at SPC for the Japanese and Korean fleets. Thus, most of the problems with the logsheet data provided to SPC, discussed below, particularly concerning under-reporting and verification, apply equally to the logsheet data processed nationally.

Purpose

The catch and effort logsheets collected by SPC are provided by member countries and territories. The members collect the logsheets from either domestic fleets or DWFNs fishing under access agreements. SPC does not collect logsheet data from DWFNs directly.

Many different logsheet forms have been used; however, they all share the following essential information: vessel name; vessel registration number; vessel flag; date; set position (longline and purse seine) or school position (pole-and-line) or noon positions (troll; longline and purse seine, if no sets are made; pole-and-line, if no schools are fished), to the nearest minute of latitude and longitude; the number of hooks per set (longliners); set time (purse seiners); and the catch by species. The catch by species is for the *target* species. While space to record by-catch and discards exist on several of the forms that have been used, information on by-catch and discards have, in practice, rarely been recorded.

These data are collected by SPC for the following reasons:

1. to process the data on behalf of certain members, so that the data can be incorporated into computer databases established by SPC in those member countries and territories;

2. to allow SPC to publish timely estimates of monthly catch rates, aggregated by fleet, and maps of the annual distribution of fishing effort, aggregated by gear type, in the quarterly *SPC Regional Tuna Bulletin*;

3. to allow SPC scientists to conduct detailed analyses of catch and effort, such as the standardisation of catch rates in order to construct indices of stock abundance; and

4. to provide the input for data aggregated by time-area strata and to estimate annual catches for the fleets of SPC members.

Table 3 summarises the amount of logsheet data processed annually at SPC. The entire logsheet database, covering 1979—1993, includes data for 4,687 individual vessels and contains over 1.1 million records. The database takes up 213 MB of storage; however, when working space is included, the total amount of disk space required to maintain the database is roughly four times the storage space, or about 800 MB.

Institutional Arrangements

The logsheet data are provided to SPC by members[1/] on a completely voluntary basis (though subtle reminders from SPC sometimes facilitate the process). As with all other types of tuna fisheries data compiled by SPC, there is no formal international agreement which commits the members to provide the data to SPC. Nevertheless, most members provide their logsheet data on a regular basis, at intervals ranging from bi-weekly to annually, depending on the quantity of data.

Certain members are required to mask the identity of vessels flying their flag (but not the identity of *DWFN* vessels) in logsheet data provided to SPC. Masking the identity of individual vessels with codes does not pose any particular problem for SPC, since most usages of the data do not require vessels to be treated separately. Those that do require that vessels be treated separately usually do not require that the absolute identity of the vessel be known, therefore codes are usually sufficient.

Coverage of Domestic Fleets

Logsheet data covering the fleets of the coastal states and territories are virtually complete. Most domestic fleets only fish within their EEZ. However, when domestic vessels venture into international waters, their activities are usually covered by the logsheet data provided to SPC.

Lack of High Seas Logsheet Data for DWFN Fleets

Logsheet data covering DWFNs, on the other hand, are incomplete for three reasons. First,

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1/ During 1992, daily catch and effort logsheet data were received at SPC from fifteen member countries and territories: Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Kiribati, Marshall Islands, New Caledonia, New Zealand, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu and the United States of America.

historically, submission of catch and effort data covering the high seas were not explicitly included as a condition of access. Second, certain DWFNs do not report all activities that they should report under the conditions of access (non-reporting). Third, for those activities that certain DWFNs do report, the catches recorded on the logsheets are biased (under-reporting).

Less than the majority of pole-and-line and purse seine catches and possibly half of longline catches are taken on the high seas. Since high seas data have not usually been specified as a condition of access, they have not usually been provided to members by DWFNs.[1/] The Japanese, in particular, are meticulous in only providing data within the EEZ of the SPC member country with which they have an agreement. On occasion, data covering Korean and Taiwanese vessels have included high seas data, but it would appear to be the result of inefficient procedures for submitting data to members, rather than the purposeful inclusion of high seas data by those DWFNs.

The situation, however, may improve in the near future. South Pacific Forum member countries have agreed to impose the submission of high seas data as a condition of licensing, although, at present, only Taiwan has agreed to the condition.

The exception to the above is the American purse seine fleet, which submits logsheet data covering the high seas as an explicit condition of the Multilateral Treaty with Certain Pacific Island States, which came into effect in June 1988. Under the treaty, data covering the high seas within the treaty area (Figure 1) must be submitted. In practice, high seas data both within and beyond the treaty area have been submitted. Coverage of the American fleet by logsheet data submitted under the treaty is virtually complete.

Non-Reporting and Under-Reporting by DWFN Fleets

Non-reporting and under-reporting[2/] have been documented for Korean and Taiwanese purse seine fleets (Lawson 1992a). Coverage by logsheet data held at SPC of Korean and Taiwanese catches for 1980—1991 is only 19 and 23 per cent respectively, much less than would be expected even after high seas catches are taken into account.

The low coverage of catches by Taiwanese vessels was due primarily to under-reporting, while for Korean vessels, low coverage was due to both non-reporting and under-reporting. Under-reporting by Taiwanese vessels appears to have been due to sets not being recorded on logsheets and to bias in the catch per successful set. All individual Taiwanese vessels examined appeared to have under-reported, although the magnitude of under-reporting varied considerably among vessels. Under-reporting by Korean vessels appeared to be due to the reporting of successful sets as unsuccessful and to error in the catch of sets reported as successful. Only some of the Korean vessels appeared to have under-reported.

1/ Compare, however, the situation in the western Indian Ocean, where all DWFN purse seiners submit daily catch and effort data covering the high seas surrounding the Seychelles EEZ, to Seychelles Fishing Authority (SFA), even though such data have not in the past been explicitly mentioned in their agreements with the Seychelles. In 1982, at the start of the Indian Ocean purse seine fishery, the precedent was set when the French fleet submitted high seas data to SFA. The precedent has been adhered to ever since, by all purse seine fleets with agreements with the Seychelles.

2/ The rate of non-reporting is defined as the proportion of the catch from fishing effort that is not recorded on the logsheets, while the rate of under-reporting is defined as the proportion not recorded on logsheets of the catch from fishing effort recorded on logsheets.

An increase in catch rates reported on logsheets provided by Taiwanese purse seiners in recent months indicates that the level of under-reporting by Taiwanese vessels may be declining. The National Fisheries Research and Development Agency of Korea has recently indicated that the level of non-reporting and under-reporting by Korean purse seiners may also decline in the near future.

Verification of Logsheet Data With Unloading Data

Catches recorded on logsheets for purse seiners are usually estimated by multiplying the number of brails taken to load the fish from each set by a constant representing the average tonnage per brail. While the constants representing the average tonnage per brail vary depending on the species composition and the size of the fish in the brail, the catches recorded on logsheets, the "hailed weights," are less accurate than the catches measured with a scale during unloading. Purse seiners in the SPC region unload either at canneries[1/] or onto carrier vessels, which transport the catches to canneries within the region and beyond.

Verification of logsheet data with unloadings has not occurred on a regular basis because of the difficulty of compiling the unloading data, especially for catches unloaded onto carriers at sea. However, the situation is improving due to the establishment of port sampling programmes throughout the region[2/] and to the recent ban on transshipment at sea, which was implemented in June 1993 as part of the minimum terms and conditions of access by the South Pacific Forum countries. As a result of the ban, the opportunities for obtaining unloading weights have increased, since vessels must now enter port before they can unload their catch.

Unloading data covering American purse seiners have been collected at Pago Pago, American Samoa, by the National Marine Fisheries Service of the United States. The Micronesian Maritime Authority (MMA) has collected unloading data covering offshore DWFN longline fleets for several years and has recently begun collecting data covering Korean and Taiwanese purse seiners in Chuuk and Kosrae, Federated States of Micronesia. However, unloading weights for Japanese purse seiners and distant-water longliners, which unload their catches in Japan, are not systematically collected by the Japanese government and used to verify logsheet data.

By-Catch and Discards

By-catch and discards occur in most fisheries, and tuna fisheries in the western tropical Pacific are no exception. However, the purse seine and longline logsheet data provide little information on by-catch and discards. Reported by-catch accounts for only 0.21 per cent of the catch on purse seine logsheets held at SPC, while the amount of discards reported accounts for 0.24 per cent of the total catch. Logsheet data for longliners show a somewhat greater amount of reporting of by-catch, 12.6 per cent of the total catch, but reported discards are negligible, 0.3 per cent.

While provision is made on most logsheets for the reporting of by-catch and discards,

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1/ Canneries in the SPC region are located at Pago Pago, American Samoa; Eden, Australia; Levuka, Fiji; Nelson, New Zealand; and Noro, Solomon Islands.

2/ Port sampling programmes for both domestic and DWFN longliners have been implemented at Chuuk, Pohnpei and Yap, Federated States of Micronesia; Lami and Levuka, Fiji; Papeete, French Polynesia; Majuro, Marshall Islands; Noumea, New Caledonia; and Koror, Palau (Lawson and Williams 1993). Port sampling for purse seiners occurs at Pago Pago, American Samoa; and Chuuk and Kosrae, Federated States of Micronesia.

experience has shown that reliable information on by-catch and discards is best collected by observers present onboard the fishing vessel. Observers currently monitor the American purse seine fleet; Japanese, Korean and Taiwanese longliners, and Korean and Taiwanese purse seiners, active in the waters of the Federated States of Micronesia; and certain fleets active in the waters of Kiribati. However, observer coverage is currently low. Increased observer coverage, which is expected following the commencement of the European Community-funded South Pacific Regional Tuna Resource Assessment and Monitoring Programme at SPC in 1994, will greatly assist in monitoring by-catch and discards.

Data Confidentiality

The South Pacific Commission does not own the logsheet data held by the TBAP. SPC is merely the custodian of the data, always acting on behalf of the SPC member countries and territories. The fact that SPC maintains, and has always maintained, the logsheet data in strict confidentiality is well understood and appreciated by members.

The SPC policy on confidentiality of tuna fisheries data submitted by members to the TBAP was established at the Twentieth Regional Technical Meeting on Fisheries, 1-5 August 1988, Noumea, New Caledonia:

> *The dissemination or publication of summaries of data relating to individual countries is regulated in strict accordance with the confidentiality requirements of the country or agency supplying the data. Only the country or agency supplying the data, or other countries or agencies so designated in writing by the country or agency supplying the data, will receive summaries.*
>
> *The dissemination or publication of summaries of catch and effort data relating to the region as a whole will only be disseminated in a form aggregated by time period and by geographic area wherein the minimum level of aggregation will be (i) by month and (ii) one-degree square of latitude and longitude. When this level of aggregation is not sufficient to meet the confidentiality requirements of a country or agency, the confidentiality requirements of the country or agency will have priority.*[1/]

The policy allows SPC to release aggregated data to third parties. Though not specified in the policy, whenever such releases of data occur, the member which supplied the data to SPC is notified of the impending release, with details regarding who will receive the released data and the usage to which the data will be put. If the member objects to the release of data within ten working days from the date of notification, then the data are not released. SPC has released aggregated logsheet data to several third parties over the years, usually to universities for use in studies on the economic value of tuna fisheries. On a few occasions, SPC has declined to act on requests for the release of aggregated logsheet data to third parties when it was judged that the proposed usage would not benefit SPC members.

SPC is not authorised to release logsheet data aggregated by EEZ. In the one instance when SPC acted on behalf of a third party to request special authorisation from a member to release their logsheet data aggregated by EEZ, the request for authorisation was refused. Whenever the matter has arisen since, SPC has informed third parties that SPC will not attempt to seek special authorisation on their behalf for the release of logsheet data aggregated by EEZ. Third parties are, however, informed that they can attempt to obtain such authorisation directly from the member,

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1/ South Pacific Commission (1988)

rather than through the intermediary of SPC. No such authorisation, obtained directly by a third party from a member, has yet been conveyed to SPC, therefore SPC has never released logsheet data aggregated by EEZ.

Aggregated Catch and Effort Data

Purpose

SPC compiles catch and effort data aggregated by time-area strata, usually 1° latitude x 1° longitude and month for pole-and-line and purse seine, and 5° x 5° by month for longline and troll. The aggregated data covering DWFN fleets have either been published by the DWFNs and are therefore in the public domain[1/], or have been provided directly to SPC. Aggregated data covering domestic fleets are compiled from logsheet data held at SPC. The aggregated data are maintained at SPC for the following reasons:

1. for use in assessing the status of tuna stocks in the region;

2. to estimate annual catches in the SPC statistical area; and

3. to support the work of the South Pacific Albacore Research (SPAR) group, the Western Pacific Yellowfin Research (WPYR) group and the Standing Committee on Tuna and Billfish (SCTB).

The aggregated data for a fleet include the year; the time stratum (usually month, sometimes quarter), the area stratum (the 1° x 1° area or the 5° x 5° area); a measure of effort (number of hooks for longliners, or number of days fished or searched for purse seine and pole-and-line vessels); and the catch of target species (numbers of fish for longliners, or tonnage for purse seine or pole-and-line vessels). The numbers of fish caught by longliners are converted to tonnage using average weights provided either by DWFNs or determined at SPC.

Table 4 summarises the amount of aggregated DWFN catch and effort data processed annually at SPC. While the total catch covered by the aggregated data is 2.7 times greater than the logsheet database, the number of records and storage space is much less. The entire aggregated database, covering 1962—1991, contains approximately 247,000 records, which take up 45 MB of storage space.

Quality of Aggregated Data

Aggregated data provided to SPC by DWFNs are compiled from catch and effort logsheet data collected from distant-water vessels, which are raised based on the coverage by the logsheet data of the total effort within each time-area stratum. The data are not usually verified with unloading data or other types of data. Coverage rates are sometimes quite low, which has given rise to questionable raised catch estimates. In any case, the quality of some of the aggregated data is not consistent, since coverage rates have varied considerably from year to year.

A problem particular to the aggregated data for longliners is related to the proliferation since 1987 of offshore vessels from Japan, Taiwan and, more recently, mainland China, which are based

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1/ Fisheries Agency of Japan, undated a, undated b; National Fisheries Research and Development Agency, 1980, 1981, 1985, 1988, 1990; Tuna Research Center, 1975—1992.

in the SPC region. The fishing activities of many of these small (less than 100 gross tonnes) vessels are not always monitored by their national governments.[1/] Therefore the aggregated data for the longline fleets of Japan and Taiwan do not cover these vessels. The catch by offshore vessels in the SPC statistical area represented approximately 13 per cent of total Japanese longline catch in 1990 and 27 per cent of the total Taiwanese longline catch in 1991.

Timeliness of Aggregated Data

The timeliness of the availablility of aggregated data from DWFNs varies. Japanese pole-and-line and purse seine data are provided with a lag of about one year from the end of the calendar year during which the fishing took place, while Japanese longline data suffer a lag of about two years. The Fisheries Agency of Japan has recently moved to increase the efficiency of the collection of Japanese longline data. Taiwanese distant-water longline data are usually available within eighteen months. The most recent Korean longline data dates back to 1987; however, the National Fisheries Research and Development Agency has indicated that the backlog of longline data, as well as purse seine data back to 1985, should be available by the end of 1993.

The timeliness of aggregated troll data, which are provided by the United States, has varied in recent years. The data currently available cover the 1990/91 season. Data for American trollers for the 1991/92 season should be available by the end of 1993.

By-Catch and Discards in Aggregated Data

By-catch and discards are not covered by the aggregated data, as may be expected since they are compiled from logsheet data, which exhibit poor coverage of by-catch and discards.

Confidentiality of Aggregated Data

The level of confidentiality of aggregated data imposed by SPC depends on the source of the data. The aggregated data for domestic fleets, which are compiled from catch and effort logsheets held at SPC, are treated with the SPC policy on confidentiality discussed above.

Aggregated data in the public domain, which covers Korean and Taiwanese longliners, and Japanese longline and pole-and-line vessels up to 1980, are not considered confidential.

Aggregated data covering Japanese fleets since 1980 (which are not in the public domain) are only released to a third party after authorisation has been obtained from the Fisheries Agency of Japan. The intention to use the Japanese data since 1980 in any SPC document presented outside SPC (such as this document: see Figures 4, 7 and 8) is communicated to the Fisheries Agency prior to the presentation.

Authorisation to distribute aggregated data covering the South Pacific albacore fisheries, namely fishing effort and catches of albacore by driftnet, longline and troll vessels, to participants in the South Pacific Albacore Research (SPAR) group has been obtained from all of the appropriate data sources. The albacore data are therefore released to participants in the SPAR group on an irregular basis, usually during meetings of the group, which, since 1989, have been held every one or two years.

1/ However, some logsheet data covering offshore longliners, collected by SPC members under access agreements, are provided to SPC.

The aggregated data held at SPC comprise what is referred to as the Standing Committee Database. Data held in the Standing Committee Database (Table 5) are potentially available to third parties. However, prior to release, authorisation must be obtained from the source of the data (except for those data in the public domain).

Annual Catch Statistics by Fleet

Purpose

Estimates of annual catches of albacore, bigeye, skipjack and yellowfin in the SPC statistical area and in the waters of eastern Indonesia and the Philippines, by fleet, are compiled at SPC in order to set the context of the deliberations of the Standing Committee on Tuna and Billfish and to inform interested parties in government and industry, within the SPC region and beyond. The Standing Committee, comprised of tuna fishery scientists from coastal states and DWFNs, meets in June each year to consider the status of the stocks of tuna and billfish in the western tropical Pacific and to review the activities of the Tuna and Billfish Assessment Programme.

The annual catch estimates cover all years of the fishery, up to the end of the previous calendar year. The estimates for the most recent years are often preliminary; they are updated as more accurate statistics become available.

The annual catch estimates have in the past been published as TBAP Technical Reports (Lawson 1992b, 1993b), following revisions made during the meeting of the Standing Committee. However, in the future, they will be published in a separate SPC series (e.g. Lawson, in press).

The annual catch estimates for each fleet are accompanied by estimates of the number of vessels active and a measure of fishing effort (usually number of hooks or number of days fished or searched), when such information is available.

Data Sources

Logsheet data held at SPC covering DWFN fleets usually suffer from incomplete coverage, while logsheet data covering domestic fleets are sometimes delayed. Aggregated data from DWFNs, while useful to estimate historical catches, are delayed and thus unavailable to estimate catches during the most recent years. Therefore, the annual catch estimates for recent years are mostly compiled from other sources known to SPC staff in government and industry.

During the compilation of estimates of 1992 catches, in early 1993, 25 individuals from 17 countries and two international organisations were approached on an informal basis with requests for information. The sources are often users of the reports on annual catches published by SPC, or personal contacts, or both, therefore the level of cooperation is high.

Catch Value

Information on the value of tuna fisheries in the SPC region has recently been compiled by FFA (Geen, personal communication, November 1993). Estimates of the value of the catch, by fleet, for 1992 are presented in Table 6. The estimates of value have been compiled on an annual basis for the whole of the region. Compilation of estimates of value with a more-detailed time-area stratification would probably necessitate the collection of sales receipts for individual unloadings per vessel. No procedures have yet been developed for the collection of sales receipts by either FFA or SPC. Sales receipts for individual unloadings are not currently collected by most DWFNs. Therefore, the compilation of estimates of value with a more-detailed time-area stratification would be impractical, at least over the short-term.

Cost of Data Management at SPC

Data management (including data compilation, processing and reporting) at SPC is conducted by four professional staff and two data entry technicians. The professional staff are also involved in activities that are not related to data management. Assuming that half of the activities of the professional staff, and all of the activities of the data entry technicians, are concerned with data management, then salary costs for data management are currently about US$ 150,000 per annum.

Assuming that half of the computer usage within the Tuna and Billfish Assessment Programme is related to data management, computer costs for data management amounted to US$ 25,000 during 1992. Assuming that half of all communications by the TBAP is related to data management, then communication costs for data management are currently US$ 6,500 per annum.

The cost of data management at SPC is therefore approximately US$ 181,500 per annum. However, only a small proportion of data management at SPC is directly concerned with high seas fisheries statistics.

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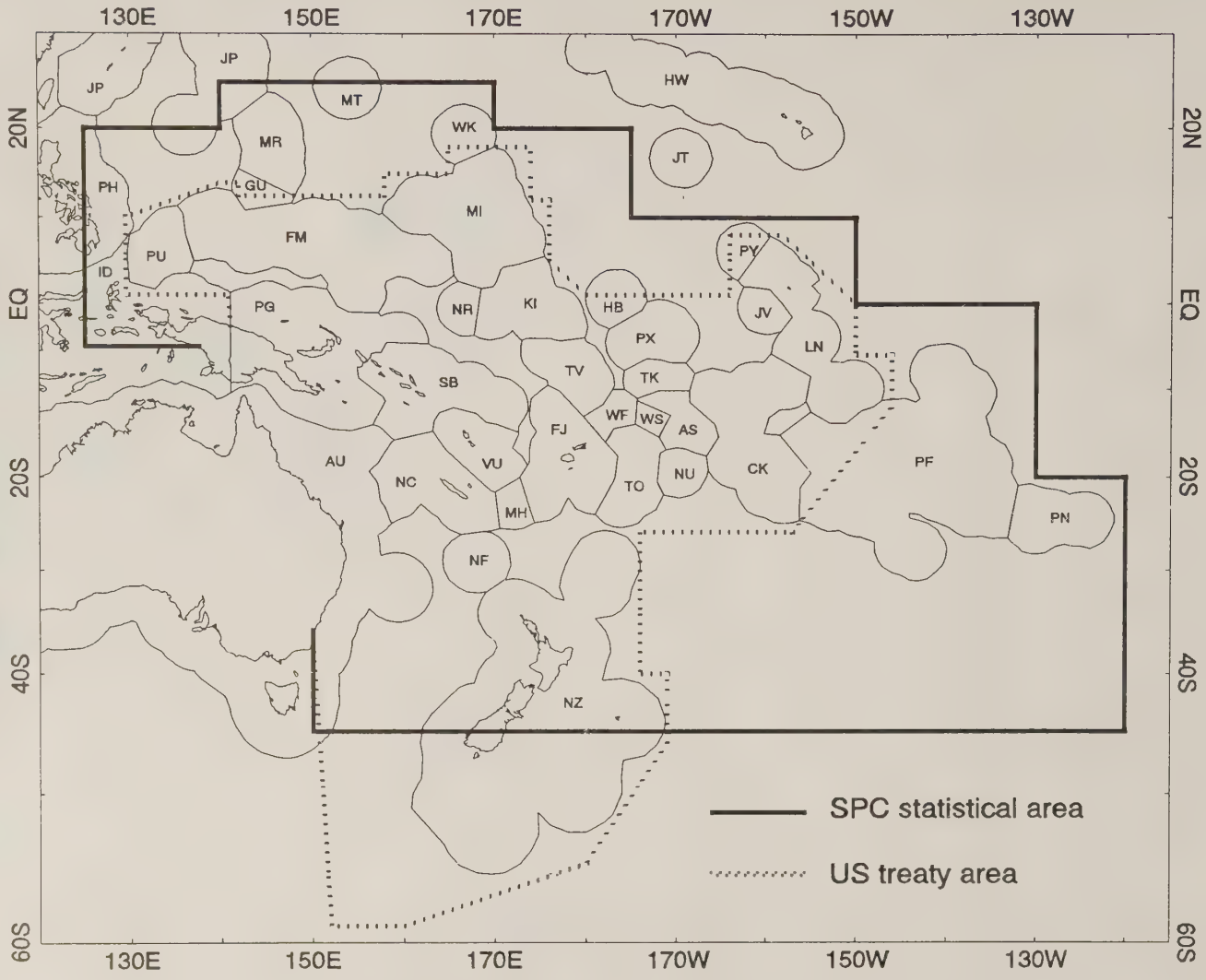

AS American Samoa
AU Australia
CK Cook Islands
FJ Fiji
FM Micronesia
GU Guam
HB Howland and Baker
HW Hawaii
ID Indonesia
JP Japan
JT Johnston
JV Jarvis
KI Kiribati
LN Line Islands
MH Matthew and Hunter
MI Marshall Islands
MR Northern Marianas
MT Minami-tori
NC New Caledonia
NF Norfolk
NR Nauru
NU Niue
NZ New Zealand
PF French Polynesia
PG Papua New Guinea
PH Philippines
PN Pitcairn
PU Palau
PX Phoenix
PY Palmyra
SB Solomon Islands
TK Tokelau
TO Tonga
TV Tuvalu
VU Vanuatu
WF Wallis and Futuna
WK Wake
WS Western Samoa

Figure 1. SPC statistical area

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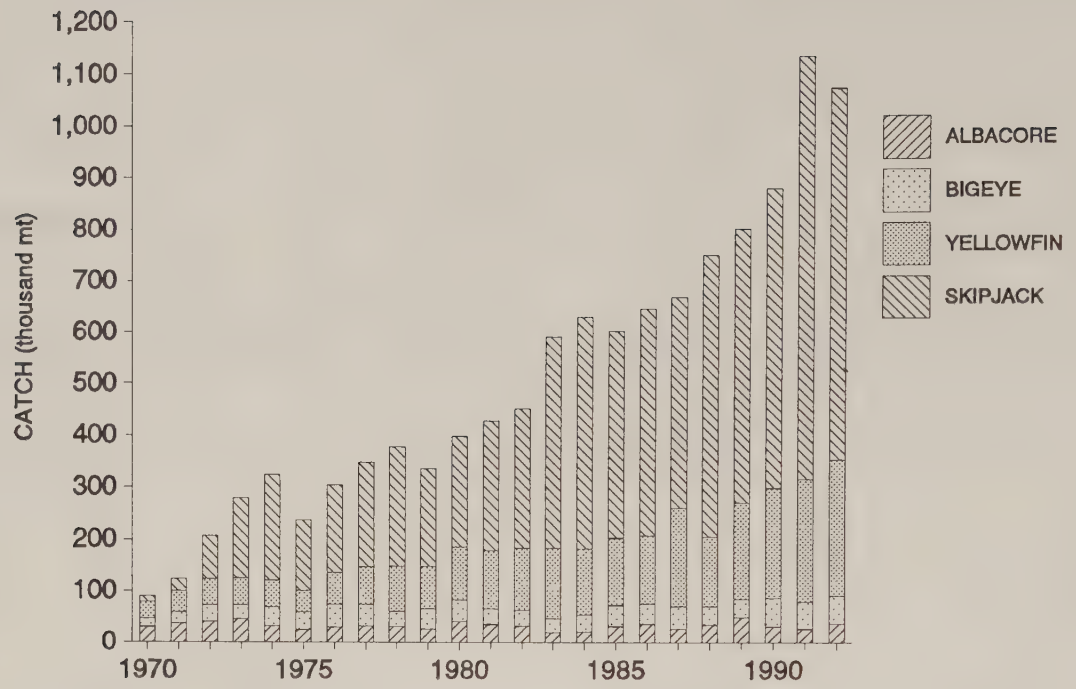


Figure 2. Annual catches by species in the SPC statistical area

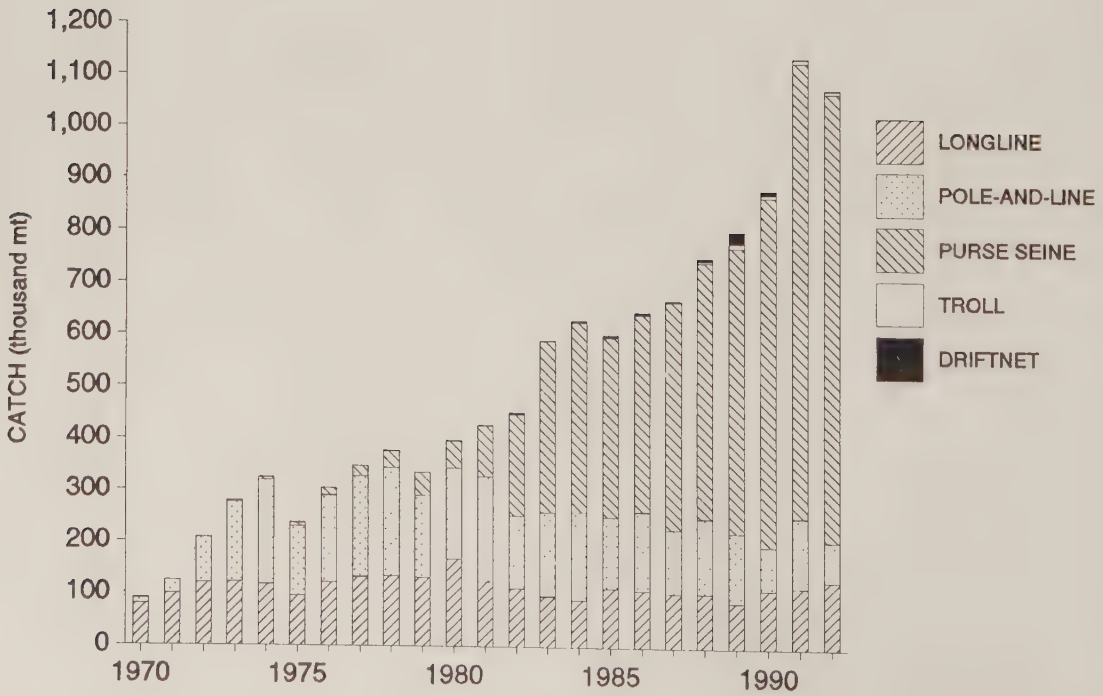


Figure 3. Annual catches by gear type in the SPC statistical area

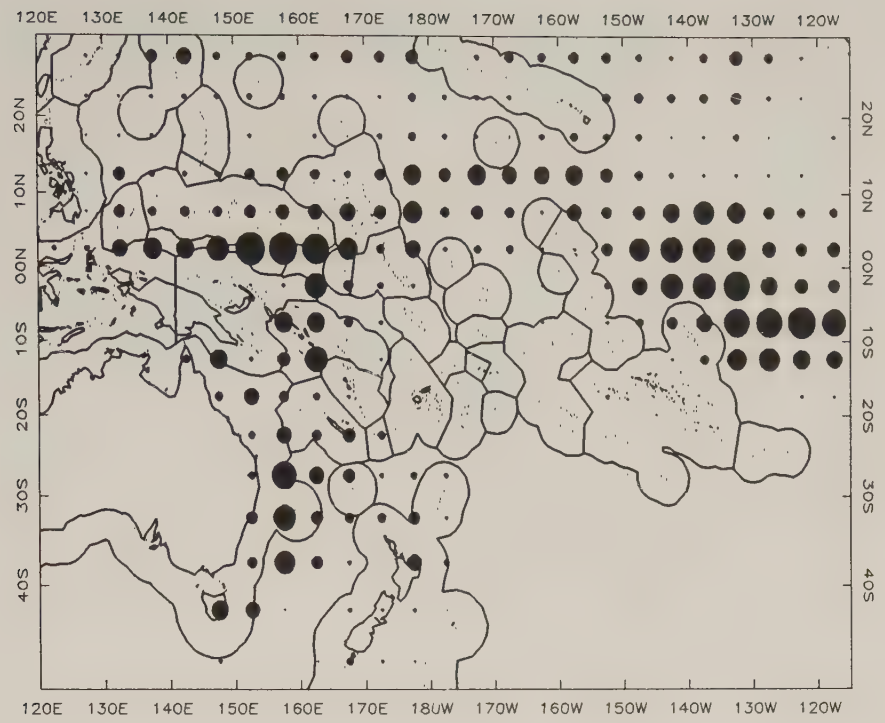


Figure 4. Japanese distant-water longline catches, 1990, by 5° quadrangles

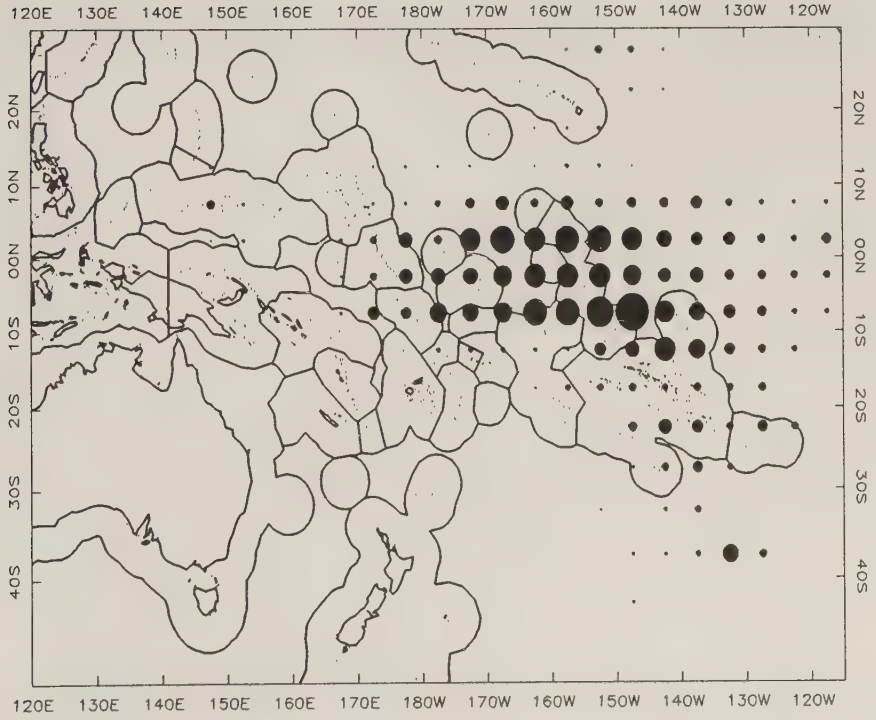


Figure 5. Korean distant-water longline catches, 1987, by 5° quadrangles

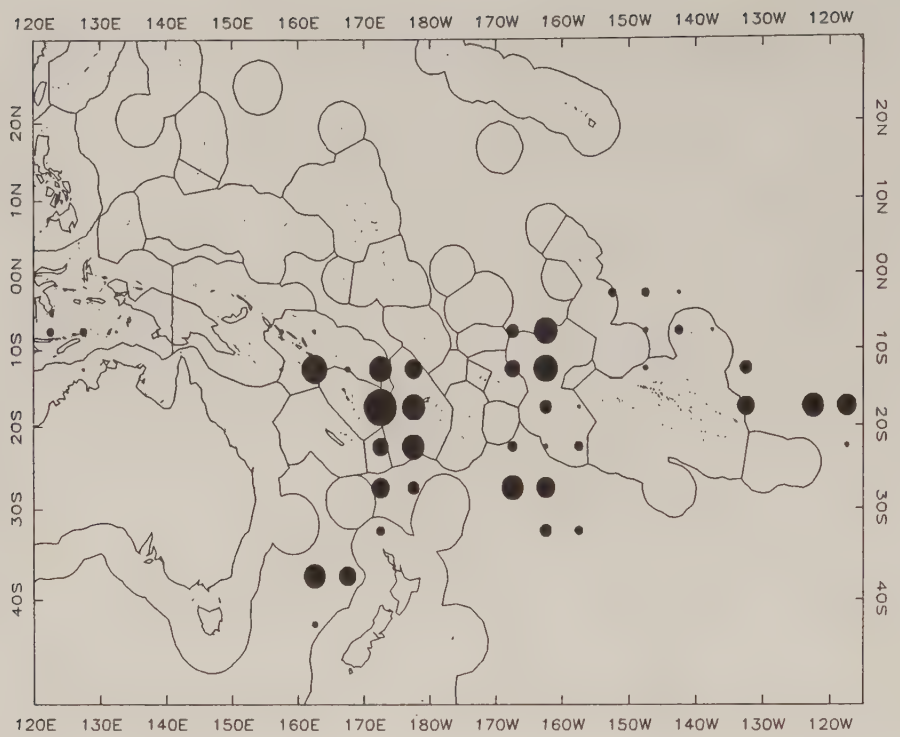


Figure 6. Taiwanese distant-water longline catches, 1990, by 5° quadrangles

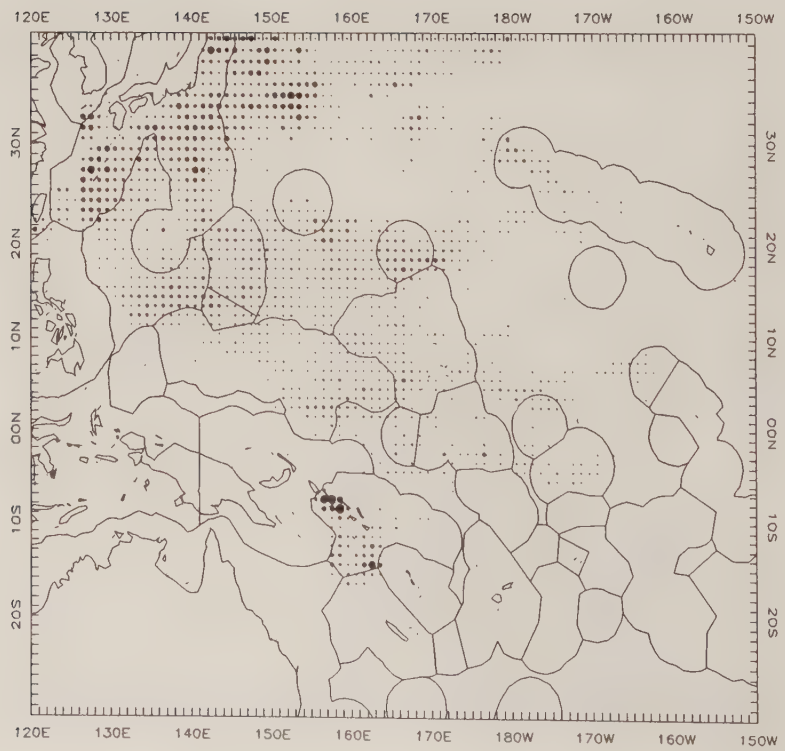


Figure 7. Japanese pole-and-line catches, 1990, by 1° quadrangles

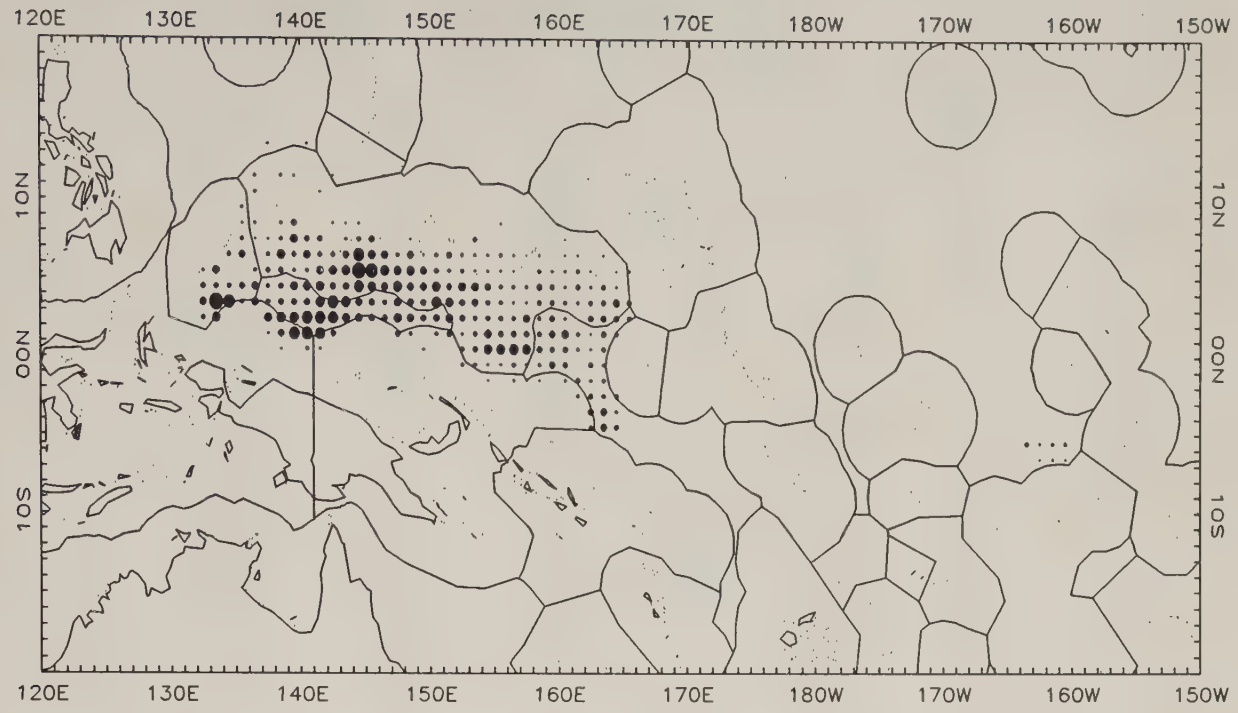


Figure 8. Japanese purse seine catches, 1991, by 1° quadrangles

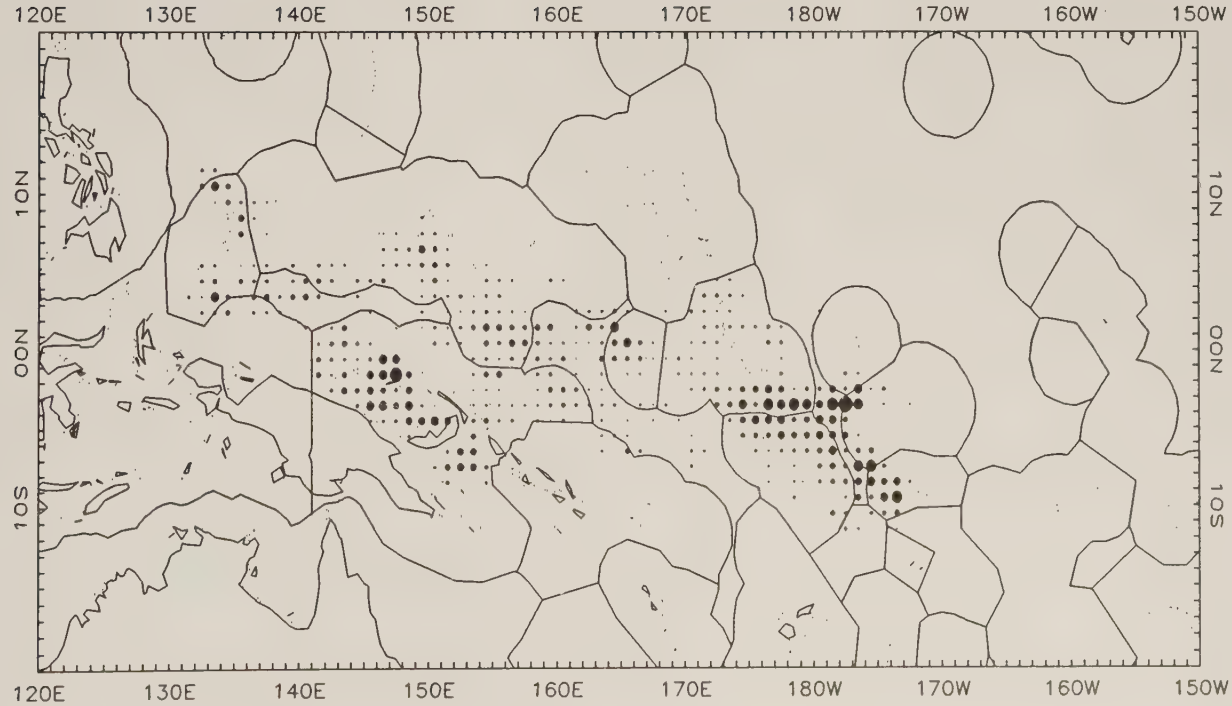


Figure 9. American purse seine catches, 1991, by 1° quadrangles

Table 1. Annual catches (mt) in the SPC statistical area and the waters of eastern Indonesia and the Philippines by species[1]

YEAR	ALBACORE[1]	BIGEYE	SKIPJACK	YELLOWFIN	TOTAL
1970	30,220	16,640	42,868	69,920	159,648
1971	37,191	22,497	58,032	81,668	199,388
1972	40,298	32,408	127,429	96,838	296,973
1973	45,830	27,584	202,579	106,277	382,270
1974	32,209	37,703	255,312	113,816	439,040
1975	24,250	34,748	189,351	107,004	355,353
1976	30,083	43,921	221,856	115,160	411,020
1977	31,821	42,478	281,547	147,208	503,054
1978	30,595	30,416	307,987	145,264	514,262
1979	25,320	39,842	267,387	147,896	480,445
1980	40,701	42,123	286,616	168,977	538,417
1981	34,936	30,431	334,449	190,953	590,769
1982	31,564	31,918	367,629	196,699	627,810
1983	19,148	27,707	527,229	218,505	792,589
1984	21,169	32,641	559,960	214,295	828,065
1985	31,016	41,357	531,112	223,462	826,947
1986	35,503	40,232	582,497	224,738	882,970
1987	25,525	44,744	551,510	273,068	894,847
1988	34,346	36,988	672,622	224,465	968,421
1989	48,817	35,237	681,513	293,207	1,058,774
1990	30,920	56,246	773,896	338,738	1,199,800
1991	26,403	52,405	1,036,531	400,458	1,515,797
1992	36,482	54,005	961,246	435,982	1,487,715

Source: Lawson (in press)

1. Catches of albacore include statistics by fishing season for driftnet vessels and trollers, rather than by calendar year; catches were allocated to the calendar year at the end of the season.

Table 2. Fleet size and catch (mt) in the SPC statistical area during 1992, by gear type and fishing nation[1]

FISHING NATION	GEAR TYPE	VESSELS	CATCH
AUSTRALIA	LONGLINE	89	1,062
	POLE-AND-LINE	10	801
	PURSE SEINE, INSIDE AFZ	7	6,208
	PURSE SEINE, OUTSIDE AFZ	5	5,128
	TROLL[4]	39	100
FEDERATED STATES OF MICRONESIA	LONGLINE	6	130
	PURSE SEINE	4	9,556
FIJI	LONGLINE	18	884
	POLE-AND-LINE	11	4,105
FRENCH POLYNESIA	LONGLINE	2	128
	POLE-AND-LINE	31	575
	TROLL[4]	4	72
JAPAN	LONGLINE, DISTANT-WATER[2]	...	61,045
	LONGLINE, OFFSHORE	...	4,734
	POLE-AND-LINE	32	50,500
	PURSE SEINE	34	184,105
KIRIBATI	POLE-AND-LINE	3	554
KOREA	LONGLINE[3]	167	36,274
	PURSE SEINE	36	201,576
MARSHALL ISLANDS	LONGLINE	4	14
NEW CALEDONIA	LONGLINE	4	930
NEW ZEALAND	LONGLINE[4]	20	706
	POLE-AND-LINE[3]	4	117
	PURSE SEINE[3]	5	6,720
	TROLL[4]	247	3,856
PALAU	POLE-AND-LINE	1	75
PHILIPPINES	PURSE SEINE[3]	15	25,417
RUSSIA	PURSE SEINE	3	2,126
SOLOMON ISLANDS	POLE-AND-LINE	32	19,737
	PURSE SEINE	3	11,179
TAIWAN (REPUBLIC OF CHINA)	LONGLINE, DISTANT-WATER	...	25,318
	LONGLINE, OFFSHORE	...	6,104
	PURSE SEINE	45	220,000
TONGA	LONGLINE	1	255
TUVALU	POLE-AND-LINE	1	9
UNITED STATES OF AMERICA	LONGLINE	6	153
	PURSE SEINE	45	193,956
	TROLL[4]	55	3,016

Source: Lawson (in press)

1. Vessels registered under flags of convenience are included with the true fishing nation, as determined by SPC.
2. Catch estimate is for 1990.
3. Catch estimate is for 1991.
4. Catch estimate is for albacore only.

Table 3. Logsheet data held at SPC[1]

YEAR	VESSELS[2]	NUMBER OF RECORDS	CATCH (MT)	STORAGE (MB)
1970	5	511	2,431	0.051
1971	29	4,060	17,003	0.402
1972	45	4,950	13,332	0.490
1973	43	7,863	28,496	0.778
1974	47	9,408	41,780	0.931
1975	52	6,460	17,952	0.640
1976	53	8,438	33,822	0.835
1977	77	11,399	27,460	1.129
1978	108	12,246	53,907	1.268
1979	920	35,371	79,589	6.149
1980	1,312	69,514	149,481	13.411
1981	1,272	85,364	181,326	16.722
1982	900	77,237	171,815	15.757
1983	739	60,667	227,148	11.647
1984	836	78,469	272,828	15.474
1985	861	77,910	247,059	15.408
1986	688	57,908	302,048	10.334
1987	839	63,748	266,490	11.852
1988	1,062	84,911	400,944	15.579
1989	1,095	96,833	463,432	17.820
1990	1,202	98,596	458,286	18.388
1991	1,045	93,574	520,191	17.005
1992	914	86,637	556,085	15.285
1993	555	30,757	216,647	5.415
TOTAL	4,687	1,162,831	4,749,551	212.770

1. Data for 1991—1993 are incomplete.

2. The total number of vessels, 4,687, represents the number of individual vessels covered by the database.

Table 4. Aggregated catch and effort data held at SPC[1]

YEAR	NUMBER OF RECORDS	CATCH (MT)	STORAGE (MB)
1962	2,393	259,220	0.646
1963	3,976	233,156	1.074
1964	4,190	213,850	1.131
1965	3,866	209,475	1.044
1966	4,101	195,852	1.107
1967	4,336	204,206	1.170
1968	4,400	193,700	1.182
1969	3,961	172,948	1.066
1970	4,604	180,776	1.232
1971	4,035	168,303	1.075
1972	9,788	367,266	1.703
1973	9,424	451,065	1.625
1974	10,472	448,582	1.751
1975	11,721	382,432	1.941
1976	11,318	494,773	1.965
1977	13,600	508,937	2.263
1978	12,147	552,194	2.129
1979	13,084	501,989	2.305
1980	13,456	592,979	2.474
1981	12,436	536,998	1.967
1982	11,156	632,926	1.753
1983	11,181	783,061	1.829
1984	10,194	830,737	1.736
1985	11,214	659,946	1.790
1986	10,046	687,165	1.660
1987	10,556	637,619	1.749
1988	8,427	613,075	1.350
1989	7,852	524,894	1.294
1990	7,935	486,381	1.273
1991	1,572	182,311	0.231
TOTAL	247,441	12,906,816	45.515

1. Data for 1988—1993 are incomplete.

Table 5. Standing Committee Database

VESSEL NATIONALITY	GEAR TYPE	TIME PERIOD	STATUS	COMMENTS
AUSTRALIA	LONGLINE	1985-1992	√	Transferred from RTFD.
AUSTRALIA	POLE-AND-LINE	1975-1992	√	Transferred from RTFD.
AUSTRALIA	PURSE SEINE	1976-1992	√	Transferred from RTFD.
FSM	LONGLINE	1991–1992	√	Tranfserred from RTFD.
FSM	PURSE SEINE	1991–1992	√	Tranfserred from RTFD.
FIJI	LONGLINE	1989-1992	√	Transferred from RTFD.
FIJI	POLE-AND-LINE	1976-1992	√	Transferred from RTFD.
FRENCH POLYNESIA	LONGLINE	1992	√	Transferred from RTFD. Deep-sea longliners.
FRENCH POLYNESIA	POLE-AND-LINE	1975–1992	x	Data to be requested of ORSTOM.
INDONESIA	DRIFTNET	1981-1992	x	Monthly catch and effort available from 1981; 909 vesels in Pelabuhan Ratu, in 1989.
INDONESIA	HANDLINE	1987-1992	x	Monthly catch and effort available from 1987.
INDONESIA	LONGLINE	1972-1992	x	Monthly catch and effort available from 1976; 22 vessels in Bali in 1972, 167 in 1989.
INDONESIA	POLE-AND-LINE	1967-1992	x	Monthly catch and effort available from 1967.
INDONESIA	PURSE SEINE	1986-1992	x	Industrial purse-seiners operating in Indonesia and, until 1990, PNG.
JAPAN	DRIFTNET	1983/84-1987/88	x	Requested of Fisheries Agency of Japan. Existence of data is unknown.
JAPAN	DRIFTNET	1988/89-1989/90	√	Provided by Fisheries Agency of Japan.
JAPAN	LONGLINE	1952-1961	x	Requested of Fisheries Agency of Japan. Existence of data is unknown.
JAPAN	LONGLINE	1962-1980	√	Statistical bulletins published by Fisheries Agency of Japan.
JAPAN	LONGLINE	1981-1990	√	Provided by Fisheries Agency of Japan.
JAPAN	LONGLINE	1991–1992	x	Data are forthcoming.
JAPAN	POLE-AND-LINE	1952-1968	x	Requested of Fisheries Agency of Japan. Existence of data is unknown.
JAPAN	POLE-AND-LINE	1969-1980	√	Statistical bulletins published by Fisheries Agency of Japan.
JAPAN	POLE-AND-LINE	1981-1990	√	Provided by Fisheries Agency of Japan.
JAPAN	POLE-AND-LINE	1991–1992	x	Data are forthcoming.
JAPAN	PURSE SEINE	1967-1991	√	Provided by Fisheries Agency of Japan.
JAPAN	PURSE SEINE	1992	x	Data are forthcoming.
KIRIBATI	POLE-AND-LINE	1981-1985	x	Catch and effort data are nonexistent.
KIRIBATI	POLE-AND-LINE	1986-1992	√	Transferred from RTFD.
KOREA	LONGLINE	1954-1974	x	Requested of Korean NFRDA. Existence of data is unknown.
KOREA	LONGLINE	1975-1980	√	Statistical bulletins published by NFRDA.
KOREA	LONGLINE	1981-1982	x	Requested of NFRDA. Existence of data is unknown.
KOREA	LONGLINE	1983-1987	√	Statistical bulletins published by NFRDA.
KOREA	LONGLINE	1988-1992	x	Data requested of NFRDA.
KOREA	PURSE SEINE	1980-1992	x	Data requested of NFRDA.
MARSHALL ISLANDS	LONGLINE	1989–1992	√	Transferred from RTFD.
MARSHALL ISLANDS	PURSE SEINE	1988–1992	√	Two vessels under US multilateral treaty. See United States purse seine.
NEW CALEDONIA	LONGLINE	1983-1992	√	Transferred from RTFD.
NEW CALEDONIA	POLE-AND-LINE	1981-1983	√	Transferred from RTFD.

Table 5 (continued)

VESSEL NATIONALITY	GEAR TYPE	TIME PERIOD	STATUS	COMMENTS
NEW ZEALAND	LONGLINE	1989-1991	√	Transferred from RTFD.
NEW ZEALAND	LONGLINE	1992	x	Data are forthcoming.
NEW ZEALAND	PURSE SEINE	1975-1988	√	Transferred from RTFD.
NEW ZEALAND	PURSE SEINE	1989-1992	x	Data are forthcoming.
NEW ZEALAND	TROLL	1968/69-1981/82	x	Data are nonexistant.
NEW ZEALAND	TROLL	1982/83-1990/91	√	Transferred from SPAR database.
NEW ZEALAND	TROLL	1991/92	x	Data are forthcoming.
PALAU	POLE-AND-LINE	1964–1982	√	Transferred from RTFD.
PALAU	POLE-AND-LINE	1985–1992	x	Data covering the single pole-and-line vessel are nonexistent.
PAPUA NEW GUINEA	POLE-AND-LINE	1970-1981	√	Transferred from RTFD. Japanese joint-venture vessels.
PAPUA NEW GUINEA	POLE-AND-LINE	1984-1985	√	Transferred from RTFD. Japanese joint-venture vessels, inactive during 1982–1983.
PHILIPPINES	VARIOUS	1964-1992	x	Monthly data are unavailable; annual data available for 1980–1987 and 1991.
PHILIPPINES	PURSE SEINE	1982-1992	√	Transferred from RTFD.
RUSSIA	PURSE SEINE	1985-1992	x	Provision of data by TINRO is under discussion.
SOLOMON ISLANDS	LONGLINE	1981-1985	√	Transferred from RTFD.
SOLOMON ISLANDS	POLE-AND-LINE	1981-1992	√	Transferred from RTFD.
SOLOMON ISLANDS	PURSE SEINE	1985-1992	√	Transferred from RTFD.
TAIWAN	DRIFTNET	1987/88	x	Data are nonexistent.
TAIWAN	DRIFTNET	1988/89	√	Provided by National Taiwan University.
TAIWAN	DRIFTNET	1989/90–1990/91	x	Provision of data pending data processing by NTU.
TAIWAN	LONGLINE	1954-1966	x	Data are nonexistent.
TAIWAN	LONGLINE	1967-1985	√	Published by NTU.
TAIWAN	LONGLINE	1986-1990	√	Unpublished data provided by NTU.
TAIWAN	LONGLINE	1991–1992	x	Provision of data pending data processing by NTU.
TAIWAN	PURSE SEINE	1983-1992	x	NTU started compilation in 1991; these data may be forthcoming.
TONGA	LONGLINE	1982-1992	√	Transferred from RTFD.
TUVALU	POLE-AND-LINE	1982-1984	√	Transferred from RTFD data provided by Fiji.
TUVALU	POLE-AND-LINE	1985	x	Data are nonexistent.
TUVALU	POLE-AND-LINE	1986-1988	√	Transferred from RTFD data provided by Solomon Islands.
TUVALU	POLE-AND-LINE	1989	x	Data are nonexistent.
TUVALU	POLE-AND-LINE	1990-1992	√	Data available through the SPC Regional Tuna Tagging Project.
UNITED STATES	PURSE SEINE	1976-1980	√	PFDF reports of exploratory fishing.
UNITED STATES	PURSE SEINE	1981-1984	√	Partial coverage provided by the American Tunaboat Association. Further data are forthcoming.
UNITED STATES	PURSE SEINE	1985-1987	x	Currently being compiled; these data are forthcoming. Limited data available in RTFD.
UNITED STATES	PURSE SEINE	1988-1992	√	Transferred from RTFD.
UNITED STATES	TROLL	1986/87-1990/91	√	Provided to SPAR database by NMFS.
UNITED STATES	TROLL	1991/92	x	Data are forthcoming.

Table 6. Value (US$) of tuna catches (mt) in the SPC region during 1992

GEAR	FISHING NATION	CATCH	VALUE	PRICE SOURCE
LONGLINE	FIJI	886	4,651,806	Japan Fresh
	FRENCH POLYNESIA	128	264,710	Japan Fresh
	FED STATES OF MICRONESIA	30	167,929	Japan Fresh
	JAPAN, DISTANT WATER	49,600	262,015,079	Yaizu Frozen
	JAPAN, LOCAL	8,350	49,239,286	Japan Fresh
	KOREA	23,600	122,590,476	Yaizu Frozen
	NEW CALEDONIA	930	4,895,000	Japan Fresh
	TAIWAN, DISTANT-WATER	9,500	21,435,100	ATSA ex-longline
	TAIWAN, LOCAL	4,300	33,740,000	Japan Fresh
	TONGA	255	570,657	ATSA ex-longline
	SUB-TOTAL	97,579	499,570,043	
POLE-AND-LINE	JAPAN	39,711	86,785,341	
	SOLOMON ISLANDS	22,250	14,248,154	
	SUB-TOTAL	61,961	101,033,495	
PURSE SEINE	JAPAN	184,105	173,979,225	
	KOREA	205,000	136,325,000	
	PHILIPPINES	31,240	20,774,600	
	TAIWAN	220,000	146,300,000	
	UNITED STATES	195,000	129,675,000	
	OTHERS	13,196	8,775,340	
	SUB-TOTAL	848,541	615,829,165	
TOTAL		1,008,081	1,216,432,703	

Source: Forum Fisheries Agency

APPENDIX O

NORTH PACIFIC ANADROMOUS FISH COMMISSION

INPFC Statistical Yearbook

1. Requirement of high seas fishery statistics

(1) The International North Pacific Commission (INPFC) was established by the International Convention for the High Seas Fisheries of the North Pacific Ocean signed at Tokyo on 9 May 1952. The Convention entered into force on 12 June 1953. The Convention applied to all waters, other than territorial waters, of the North Pacific Ocean including adjacent seas. There was no precise delimination of this area by lines of longitude and latitude. INPFC activities were concentrated in FAO statistical area 67 and part of FAO statistical areas 61 and 77.

(2) The members of INPFC were Canada, Japan and the United States. It did not include other countries fishing on the high seas in the North Pacific. Since its establishment, the Convention mainly regulated the activities of the Japanese high seas salmon fishery. The INPFC provided a forum for cooperation for the contracting parties with respect to the study, analysis and exchange of scientific information relating to the stocks of anadromous and non-anadromous species.

(3) INPFC's Statistical Yearbook has been prepared each year since 1952. As the INPFC was dissolved on February 21, 1993, it was agreed that the Yearbooks for 1990 to 1992 be published by the North Pacific Anadromous Fish Commission (NPAFC), which assumed the INPFC's obligations (1990 Yearbook was published in 1993).

The Yearbook, which contains annual catch and effort statistics of certain fisheries in the Convention area that were important to the scientific work of the INPFC.

2. Data currently collected, processed and stored (by the NPAFC)

(1) The catch and effort statistics described in the INPFC's Yearbook are for the salmon fisheries of Canada, Japan and the United States; the groundfish, shrimp and herring fisheries of Canada, Japan and the United States; joint-venture fisheries of Canada and the United States; and the king and tanner crab fisheries of the United States. Also included are catch statistics for salmon reported by the Republic of Korea.

(2) Among the above fisheries, three fisheries in the high seas were included. There was no data on value and number of vessels for the following fisheries:

(a) Japanese high seas salmon fishery (see Figs.)

As Japan prohibited its high seas salmon fishery in 1992, the last year of this fishery was 1991.

Data to be collected for this fishery in 1991 are as follows:

(i) Catch statistics of Japanese non-traditional landbased salmon fishery by 1°x 1° area, by ten day period and by species in numbers and cumulative effort in tans, including summaries by area, by month and by season.

(ii) Catch statistics of Japanese non-traditional landbased salmon fishery by 1°x 1° area, by ten day period and by species in kilograms and cumulative effort in tans, including summaries by area, by month and by season.

(iii) Catch statistics of Japanese traditional landbased salmon fishery by 1°x 1° area, by ten day period and by species in numbers and cumulative effort in standardized tans, including summaries by area, by month and by season.

(iv) Catch statistics of Japanese traditional landbased salmon fishery by 1°x 1° area, by ten day period and by species in kilograms and cumulative effort in standardized tans, including summaries by area, by month and by season.

(b) Japanese pollock fishery in the Bering Sea

Commercial pollock fishery on the high seas of the Bering Sea was not conducted after 1992.

Data to be collected for this fishery in 1991 and 1992 are Japanese fishing effort, by gear (stern trawl only), and catch (tonnes, round weight) of principal groundfish species by area (west or east of 180°).

(c) Japanese groundfish fishery in the Northeast Pacific Region

Data to be collected for this fishery in 1991 and 1992 are Japanese fishing effort by gear and catch (tonnes, round weight) of principal groundfish species. However no fishery catch has been reported for 1990 and 1991.

(3) Catch and effort statistics for above mentioned three fisheries in the high seas are provided by the Fisheries Agency of Japan as hard copies. Figures are retyped at the NPAFC Secretariat. Published Yearbooks are stored at the NPAFC library.

3. Cost related to high seas fishery statistics

Total cost for "high seas" portion of 1990 Yearbook is estimated at 675 US$.

(1)	Staff salary (2h checking by Director, 3h typing by Secretary)	100 US$
(2)	Computer cost is negligible.	
(3)	Printing ($2,403 for 400 copies* x 21p. (high seas portion)/116p. = $435)	435 US$
(4)	Communications ($771 x 21p./116p. = $140)	140 US$

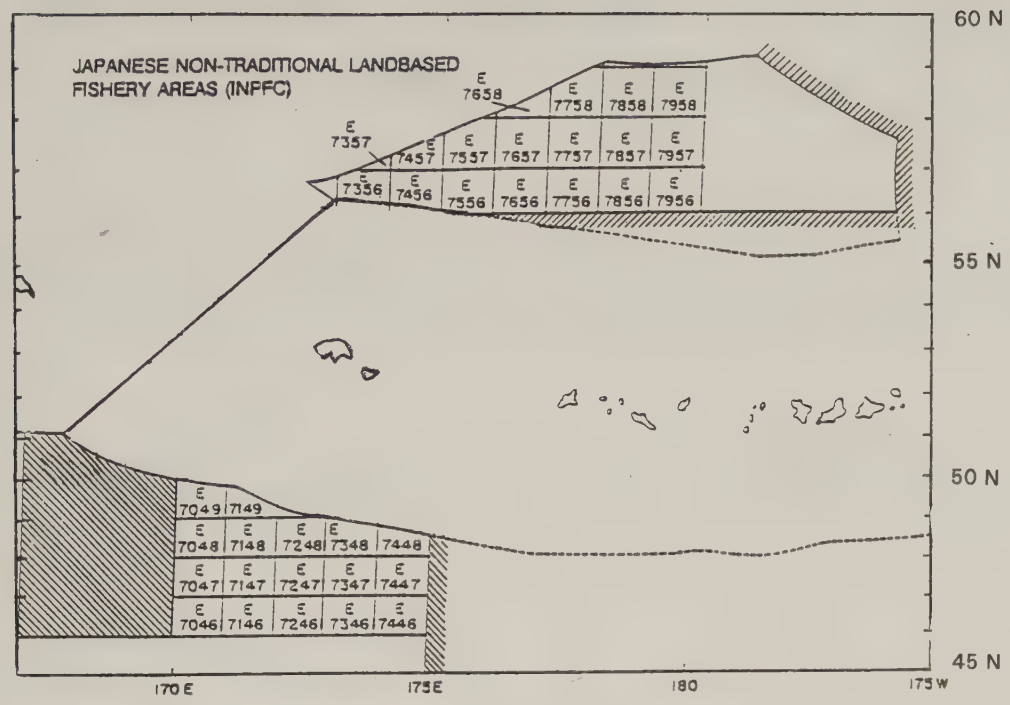
* Distribution is limited; recipients are for the most part scientists, libraries, and research agencies directly connected with the INPFC's research program.

NPAFC Statistical Yearbook

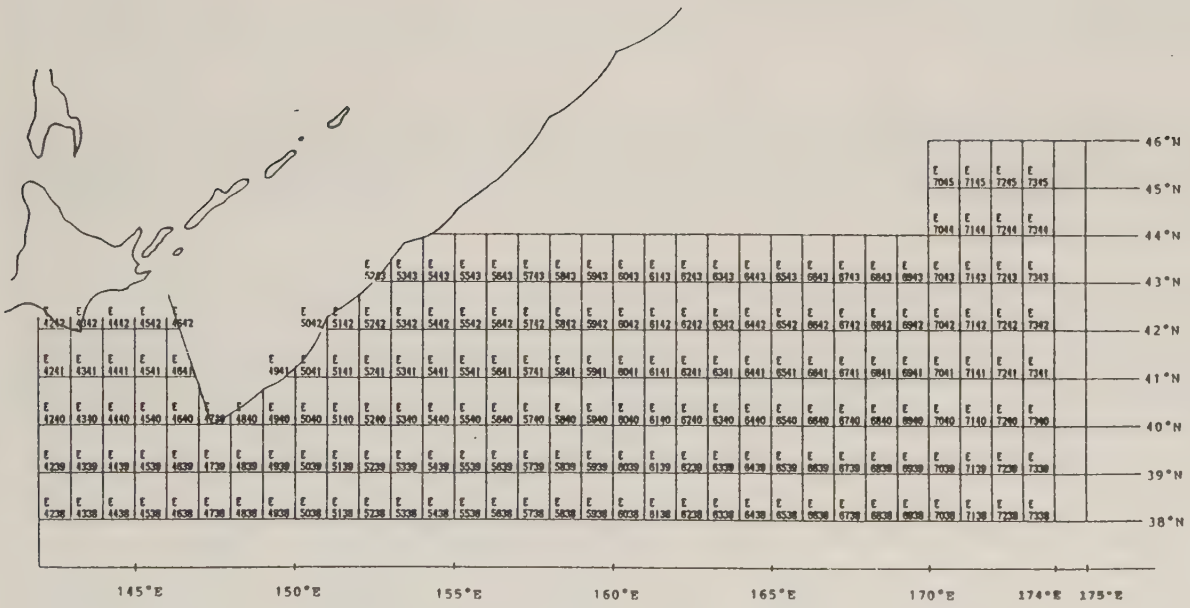
NPAFC was established by the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean, which was signed by Canada, Japan, Russia and the United States on February 11, 1992 and entered into force on February 16, 1993. The Convention prohibits high seas salmon fisheries.

Rules of Procedure of the Commission require the Executive Director to oversee preparation and publication of a Statistical Yearbook containing catch information on all harvesting of anadromous fishes in the Convention Area and adjacent waters (including associated freshwater systems) and catch information for the Convention Area and adjacent waters for ecologically related species specified by the Commission, as well as any other information the Commission may require.

At the 1st Annual Meeting held in November 1993, it was agreed that the format of the NPAFC Statistical Yearbook will be drafted by the Statistical Yearbook Working Group and the Secretariat through correspondence for consideration and approval at the 1994 Annual Meeting. The contents of the Yearbook should mainly be for salmon catches in the 200 mile zone of each country.



Statistical areas fished by the Japanese non-traditional landbased salmon fishery in 1990



Statistical areas fished by the Japanese landbased driftnet salmon fishery in 1990

APPENDIX P

FAO REGIONAL BODIES

Introduction

1. Of the FAO Regional Fishery Bodies with mandates for marine areas, only the General Fisheries Council for the Mediterranean (GFCM) and the Fishery Committee for the Eastern Central Atlantic (CECAF) have ongoing programmes for the collation and dissemination of fishery statistics.

2. Both Bodies collate the data from national authorities using STATLANT A and B questionnaires. STATLANT A questionnaires are used to report annual catch by species and statistical division and sub-division for the purpose of providing complete catch statistics by areas which are smaller than the FAO major fishing area which corresponds to the Body's area of responsibility. STATLANT B questionnaires are used to report monthly fishing effort by gear type, vessel type, vessel GRT class, main species sought, and statistical subarea or division, together with the associated catch composition by species. The STATLANT B reporting system was introduced to provide data for stock assessment purposes, and primarily to calculate catch per unit effort for use as indices of abundance. These data are not held in a database.

3. The Secretariats of both Bodies are based at FAO Headquarters. The statistical programmes of both Bodies are handled by one statistical clerk who devotes about 80% of his time to this work. He receives some part time assistance for the dispatch of questionnaires and the instructions for completion, data entry, database management and preparation of publications.

General Fisheries Council for the Mediterranean

High Seas Fisheries

4. Because national fishery jurisdictions have not been extended in the Mediterranean, high seas areas range to within 3 to 12 nautical miles from the coast and so include most of the Sea. The total catch from the Mediterranean has declined from a peak of 2.1 million tons in 1988 to 1.4 million tons in 1991.

5. Highly migratory tuna species are taken in the Mediterranean which also constitutes an important spawning area for some species such as Northern bluefin. The total catch of tuna and tuna-like species in the Mediterranean amounted to about 65,000 tons in 1991 which represents a decline from the peak catch of 75,000 tons in 1989. These figures include a large component catch (26,000 tons in 1991) of Atlantic bonito which is not officially listed as a highly migratory species in Annex 1 of the 1982 Convention. There is an extremely valuable Northern bluefin tuna fishery (15,000 tons in 1991) and an important fishery for swordfish (12,000 tons in 1991).

6. Despite the narrow national jurisdictions, the shelf areas are generally very narrow and so there are few straddling stocks of demersal species. Two exception to this are the Gulf of Lions and the Gulf of Gabes where fisheries on hake and deep sea shrimps take place beyond the 12 mile limit. GFCM has the capacity to deal with this problem in its entirety and has done so in the case of the Gulf of Lions. There are, however, straddling pelagic resources such as Mediterranean horse mackerel, which provided catches of over 100,000 tons during 1985-89 but only 32,000 tons

in 1991, and various other horse and chub mackerel species which accounted for a further 53,000 tons. Some sardine stocks resources such as that in the Sea of Alboran are also straddling stocks.

7. A rough guess of the proportion of the catch which is taken in the high seas areas is 25% in terms of weight.

STATLANT 37A and 37B reports

8. The GFCM area of responsibility is the Mediterranean and Black Seas which corresponds to FAO major fishing area 37 (Map 1). For statistical purposes, GFCM has subdivided the Mediterranean into four Subareas and these are, in turn, subdivided into 10 Divisions. These statistical divisions are used for both STATLANT 37A and 37B reports.

9. The catch statistics provided using the STATLANT 37A questionnaire are stored in the GFCM database, together with FAO estimates where data are missing or are considered unreliable, and have been published in the *GFCM Statistical Bulletin* every two years. (This publication has now been discontinued in paper form and GFCM catch statistics will in future be distributed in electronic form only.) Thus, the geographical detail in the GFCM database is finer than that in the FAO FISHSTAT NS1 questionnaire which provides most of the data for the FAO *Yearbook of Fishery Statistics: Catches and Landings* and which treats the Mediterranean as a single area. The data considered most reliable are used for both publications so that the data sets are consistent and only differ in the level of geographical detail, so that the only discrepancies are due to the fact that a difference in publication dates means that revisions and updates may appear in one but not in the other.

10. Statistical boundaries do not coincide with high seas areas and so the GFCM statistics do not distinguish between catches taken in coastal and high seas zones.

11. There are 197 species items in the GFCM database and 24 countries. There are 1400 time series in the database for the period starting in 1972.

12. However, returns of the STATLANT 37A and 37B questionnaires are very incomplete. For 1991, only 11 and 7 of the 24 countries provided the data requested on the STATLANT 37A and 37B forms, respectively.

13. The data collected using the 37B questionnaires are rarely used and GFCM plans to hold a meeting in 1994 to review the future of the STATLANT 37B reporting system. Catch and effort data by fleet are used by GFCM Working Groups for stock assessment purposes, but the scientists generally consider the 37B data to be too aggregated and they obtain more detailed data directly from national sources. (This is analogous to the situation in the ICES area where the STATLANT 27B questionnaire has been discontinued.)

14. The annual cost of the despatching and processing the STATLANT 37 questionnaires, screening the 37A questionnaires for quality, maintaining the GFCM catch database, and preparing publications every two years is on average about US$90 000. An estimate of the high seas component of this would be 25%, or US$23 000. The future dissemination of data using computer media rather than a paper publication will save about US$10 000 per issue or about US$5 000 per year.

Fishery Committee for the Eastern Central Atlantic

High Seas Fisheries

15. Map 2 shows the area of competence of CECAF which corresponds to the FAO major fishing area 34, together with EEZ and high seas zones. The total catch from the CECAF area reached a peak of more than 4 million tons in 1980 and subsequently declined to 3.7 million tons in 1991.

16. The shelf area is narrow and most catches are taken within the 200 mile EEZs. This applies to most small pelagic species as well as demersal species. The important small pelagic species in this area are European pilchard (964,000 tons in 1991), sardinellas (610,000 tons), horse mackerels (242,000 tons), European anchovy (194,000 tons) and chub mackerel (133,000 tons). Apart from the highly migratory species, only one species of fish, the oceanic horse mackerel (*Trachurus picturatus*) is known to be migrate between coastal and offshore waters. It is exploited by Eastern European fleets and by coastal States but catch statistics do not distinguish these from the more neritic species of horse mackerel (*T. trachurus* and *T. trecae*).

17. Highly migratory tuna species are the subject of major fisheries in the CECAF area. The total catch of tuna and tuna-like species was about 357,000 tons in 1991, the highest catch in the time series. Two species, skipjack and yellowfin account for over 80% of this figure with catches in 1991 of 172,000 tons and 122,000 tons respectively. Other important species are bigeye (27,000 tons in 1991) and Atlantic black skipjack (16,000 tons).

18. A rough guess of the proportion of the catch which is taken in the high seas areas is 7% in terms of weight.

STATLANT 34A and 34B reports

19. For statistical purposes, CECAF has subdivided the area into four Subareas and these are, in turn, subdivided into 12 Divisions (Map 3). These statistical divisions are used for both STATLANT 34A and 34B reports.

20. The catch statistics provided using the STATLANT 34A questionnaire are stored in the CECAF database, together with FAO estimates where data are missing or are considered unreliable, and have been published in the *CECAF Statistical Bulletin* every two years. Thus, the geographical detail in the CECAF database is finer than that in the FAO FISHSTAT NS1 questionnaire which provides most of the data for the FAO *Yearbook of Fishery Statistics: Catches and Landings* and which treats the Eastern Central Atlantic as a single area. The data considered most reliable are used for both publications so that the data sets are consistent and only differ in the level of geographical detail, so that the only discrepancies are due to the fact that a difference in publication dates means that revisions and updates may appear in one but not in the other.

21. CECAF statistics do not distinguish between catches taken in EEZ and high seas zones, although coastal States have often requested that statistics be compiled by EEZs. The catch statistics reported by distant water fishing nations operating in coastal areas are sometimes more complete than those provided by coastal States.

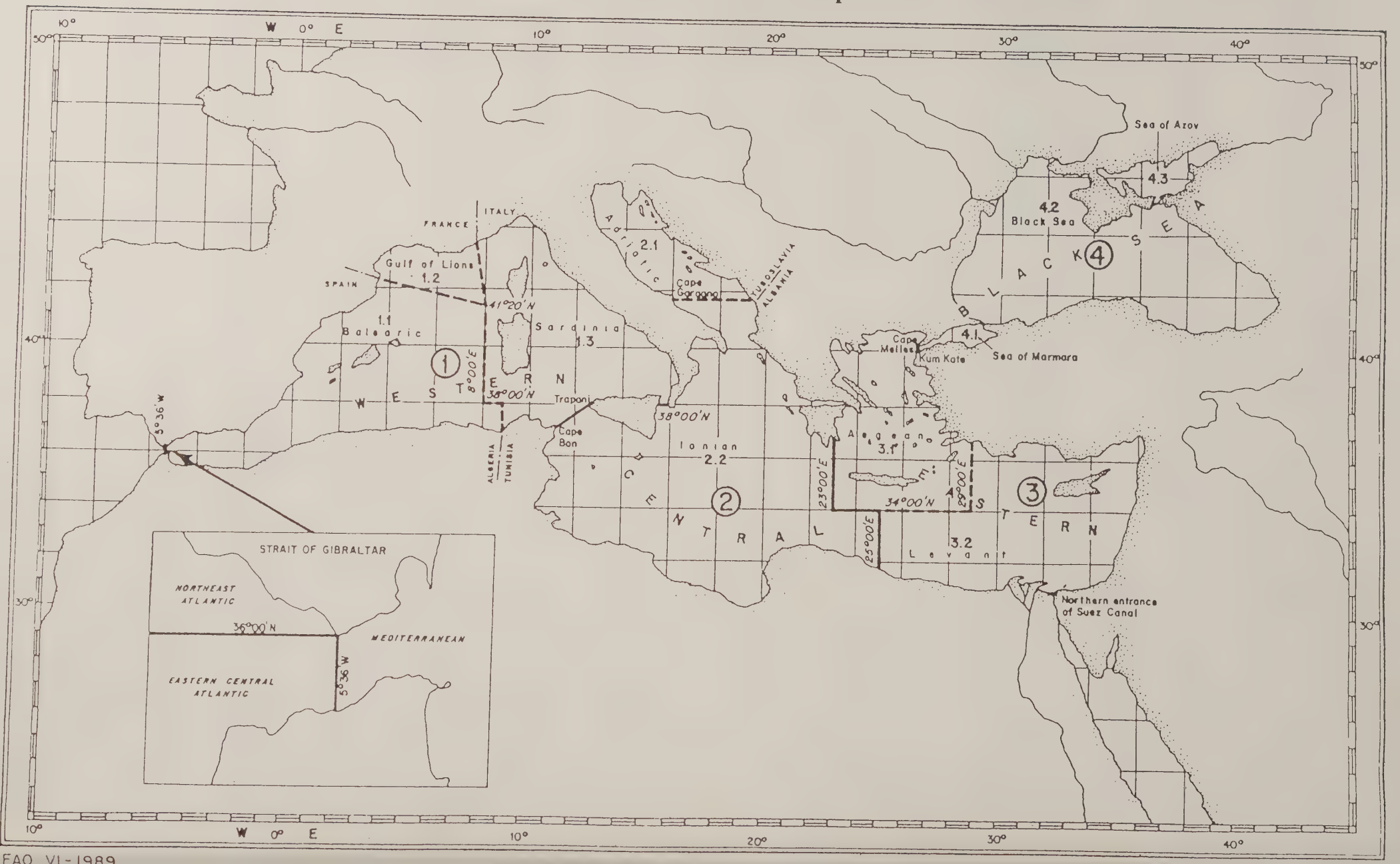
22. There are 204 species items in the CECAF database and 48 countries. There are 2964 time series in the database for the period starting in 1972.

23. However, returns of the STATLANT 34A and 34B questionnaires are very incomplete. For 1991, only 17 and 9 of the 40 countries now fishing in the area provided the data requested on the STATLANT 34A and 34B forms, respectively. Coastal States have often stated that they have difficulties in completing these forms.

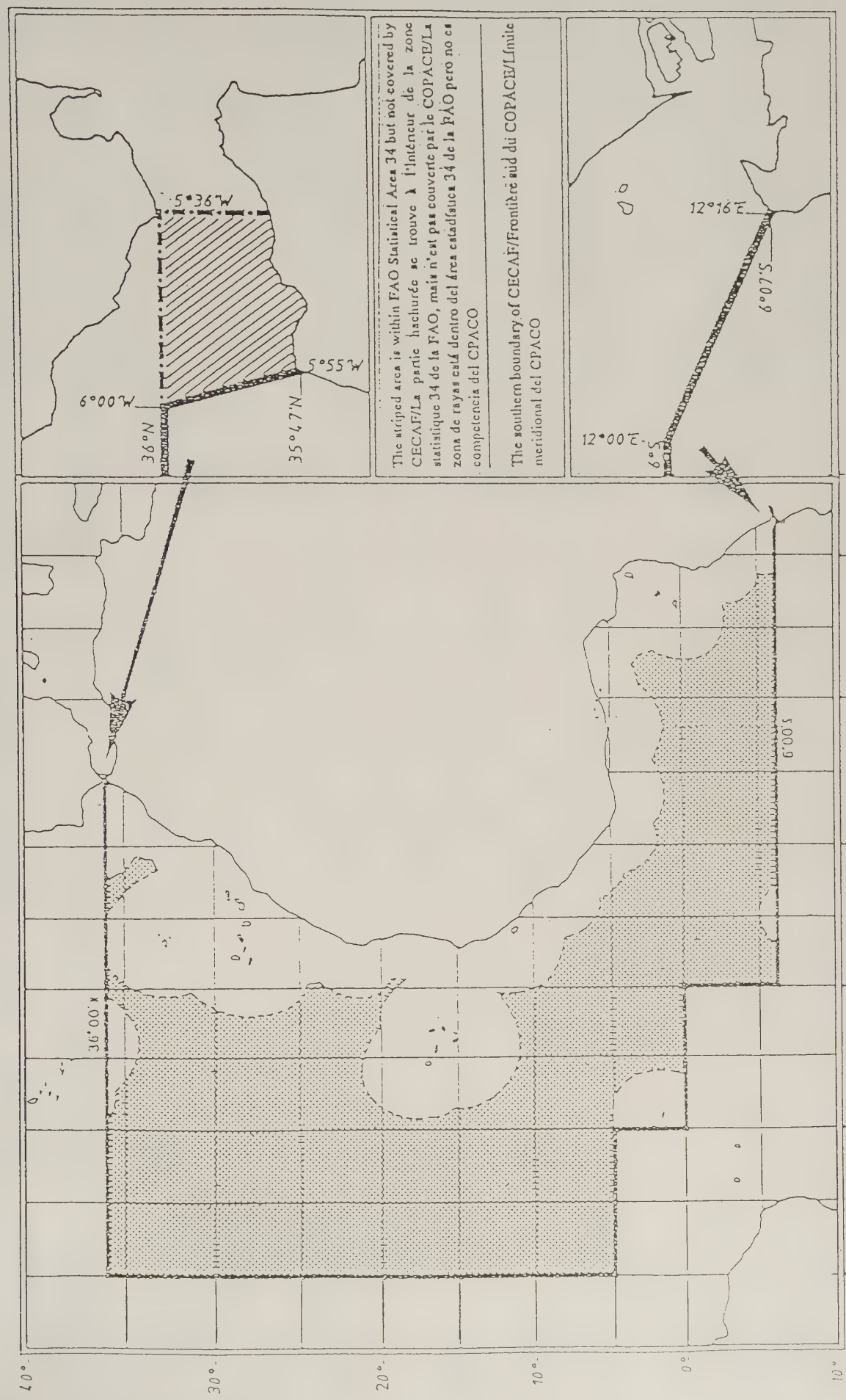
24. The data collected using the 34B questionnaires are rarely used. Catch and effort data by fleet are used for stock assessment purposes but, as for the 37B scheme for the Mediterranean, the scientists generally consider the 34B data to be too aggregated and they obtain more detailed data directly from national sources.

25. The annual cost of the despatching and processing the STATLANT 34 questionnaires, screening the 34A questionnaires for quality, maintaining the CECAF catch database, and preparing publications every two years is on average about US$90 000, the same as for the Mediterranean. Assuming that 7% of the catch is taken from high seas areas, the estimated share of the cost of the high seas proportion of the overall cost would be US$6 300.

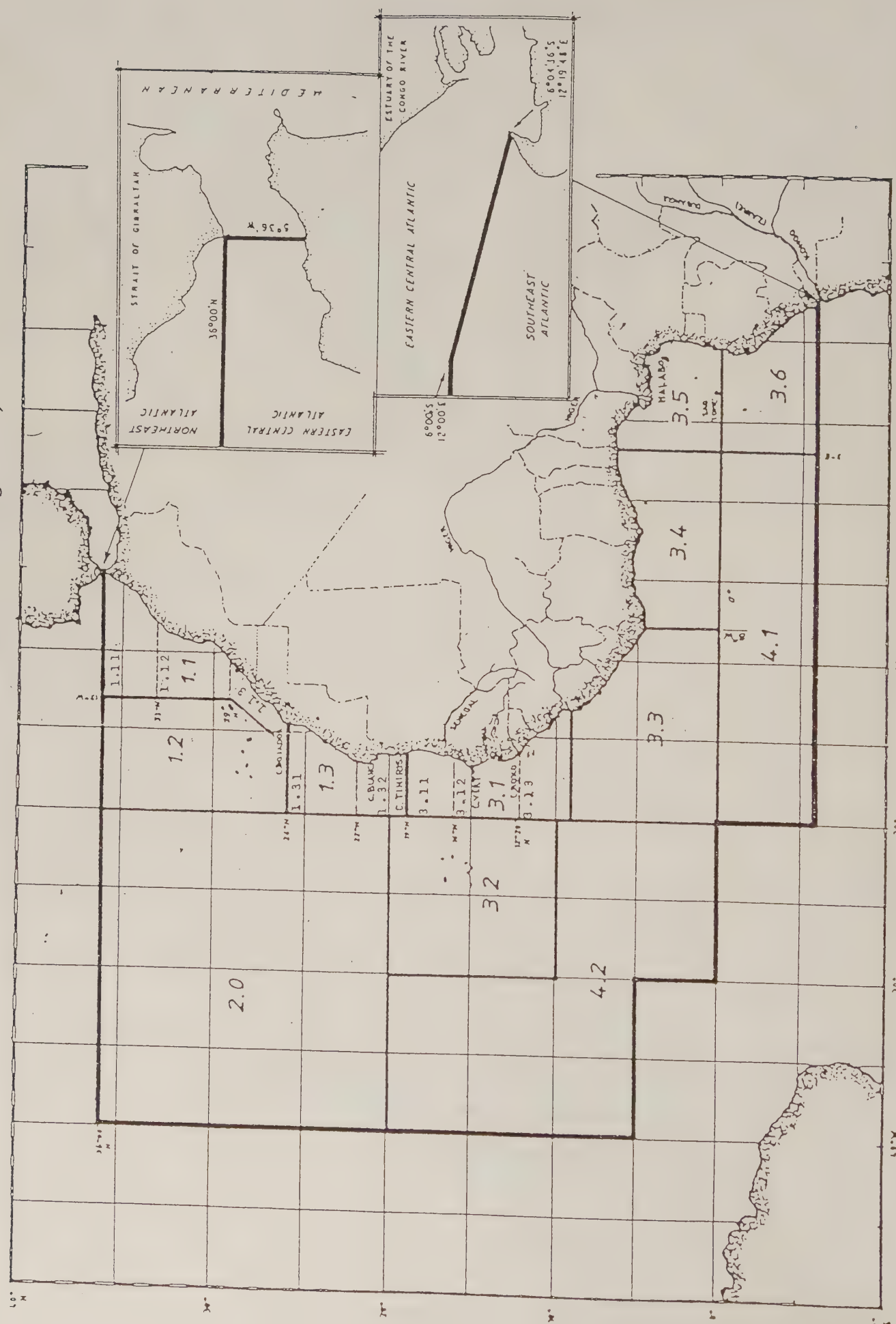
Mediterranean and Black Sea (Fishing Area 37 - GFCM): Geographical Limits of Subareas and Divisions for Statistical Purposes



Area of competence of CECAF **MAP 2**


5°36'W
6°00'W
36°N
35°47'N
5°55'W
12°16'E
12°00'E
6°07'S
6°S
6°00'S
36°00'N
40°
30°
20°
10°
0°
10°
The striped area is within FAO Statistical Area 34 but not covered by CECAF/La partie hachurée se trouve à l'intérieur de la zone statistique 34 de la FAO, mais n'est pas couverte par le COPACE/La zona de rayas está dentro del área estadística 34 de la FAO pero no es competencia del CPACO
The southern boundary of CECAF/Frontière sud du COPACE/Límite meridional del CPACO

MAP 3



Atlantic, Eastern Central (Major Fishing Area 34)

FAO VI-1989

APPENDIX Q

SUMMARY OF DATA COLLATED AND HELD BY REGIONAL FISHERIES AGENCIES

	CCAMLR	FFA	IATTC	ICCAT	ICES	IPTP	NAFO	SPC	NPAFC	GFCM	CECAF
Proportion of catch or area which is high seas	Almost all	19% of area served, 20-30% of catch	55%	Approximately 40% of catch	2% of catch	>25% of catch	About 10%	30% of catch		25% by catch weight	7% by catch weight
Statistics for high seas compiled separately?	No	Yes for some (US)	Yes	No	No	No, 1°x1° approx only	Not yet (coastal states have data)	US purse seine only; can be estimated for certain other fleets	Yes	No	No
Purposes for which data are used	Assessment,management, incidental mortality, ecosystem studies, calculation of member contributions	Economic evaluation, determination of access fees, management advice	Assessment, management, marine mammal bycatch	Assessment, management advice, evaluation of effects of regulations	Assessment, management advice	Assessment, management advice	Assessment, management advice, regulation	Assessment, management advice	Management	Assessment, management advice (limited use)	Assessment, management advice (limited use)
Availability and resolution of catch-effort data	1°x0.5° by 10-day periods; or 10x10 nmiles and haul-by-haul	See under SPC	1°x1° by month from logbooks (90% coverage), landings (95% coverage)	1°x1° by month for surface gears; 5°x5° by month or quarter for longline	1°x0.5° for some countries, ICES Division for all	5°x5° most, 1°x1° minor part	NAFO Division, finer scale nationally	Logsheet data for US purse seine; 1°x1° pole-and-line & purse seine, 5°x5° longline & troll	1°x1° by 10-day period for salmon	GFCM Division	CECAF Sub-Division
Availability of discard data	Yes for some fisheries	Source observer programme	Yes, observers	Partial coverage by observers	Three countries only	No	Some observers	Negligible data reported on log-sheets	No	No	No
Availability of mammal and bird bycatch data	Yes	No	Yes, observers	One inquiry	No	No	No	No	No	No	No
Availability of biological data	Length/weight/age/maturity compositions	Length frequency data, given to SPC	Length frequency, growth, mortality rates, morphometrics, spawning, recruitment, mixing rate, blood, diet, age, maturity	Length compositions, sex by size, maturity, mortality rates, spawning	Nationally only; extensive data provided nationally	Length compositions	Length, age, maturity compositions	Length compositions, tagging data	Nationally only	Nationally only	Nationally only
Availability of economic data	No	Yes	No	No	No, one pilot study	No, requested for 1992	No	No, see under FFA	No	No	No
Availability of environmental data	Yes	No	Yes	No	Not linked to fishery data	No	Yes	Access to ORSTOM data	No	No	No
Availability of vessel data	Yes, type and size	Yes, 1,000+ vessels	Yes, also skippers	Fleet statistics	No	Yes	Yes, vessel list	FFA Regional Register, plus additional data	No	No	No

Summary of Data Collated and Held by Regional Fisheries Agencies (continued)

	CCAMLR	FFA	IATTC	ICCAT	ICES	IPTP	NAFO	SPC	NPAFC	GFCM	CECAF
Catch data verification methods	Observer programmes	Observer programme, transshipment-monitoring,unloading data	Observers; staff contact with vessels, canneries, agents, and others; statistical analyses; independent sourcing	Trade data, certificates of origin, port sampling, observers, transshipment tracking	Landing declarations in some countries	Transshipments	Observer programme, hail system	Unloadings; FFA- and national observers; SPC observers in 1994	No	No, possibly nationally	No, possibly nationally
Restrictions on access to data	Subject to owner's (state's) permission	Access for members via computer networks	Confidential for individual company or vessel. Aggregated data regularly published	Open access for most data	Open access to aggregated data	Open access, under review	Open access for aggregated data	Subject to owner,s (state's) permission unless public domain	Open access	Open access	Open access
Total data volume	200 MB total, 5700 records per year	1.8 GB	1.0 GB	108 MB (5 MB per year)	2.5 MB for STATLANT 27A data for 1973-1992		17,500 records per year from 1960	Logsheet data: 213 MB & 1.2 million records. Aggregated data: 45 MB & 247,000 records	Not stored in database	1400 time series,1972-1991	2964 time series
Database management system	Powerhouse	Oracle, MSAccess, Foxpro	Datatrieve	In house (Fortran)	SAS, In house (Cobol)	Foxbase, dBase	dBase	Oracle, FoxPro	None	In house (Fortran)	In house (Fortran)
Computer system	Vax	HP 9000	Vax	Microvax	HP9000	Networked PC	PC	HP 9000; PC network	None	IBM mainframe	IBM mainframe
Annual cost to the agency of statistical programme	$ 31,500	$ 227,800	$ 512,000 (excluding observer costs)	$208,000	$146,100	$525,000	$170,000	$181,500		$ 90,000	$ 90,000
Annual cost to the agency of high seas statistics	$ 31,500	$ 88,100		$83,190	$7,300		50-75% of programme (not proportional to high seas catch)	$20,000	$ 700	$ 23,000	$ 6,300
Annual value of fisheries and total catch		See under SPC	$ 400 million	$ 1.0 billion 700,000 tons			3 million tons	$ 1.2 billion 1.1 million tons			

APPENDIX R

SPECIFICATION OF THE REQUIREMENTS FOR STATISTICS ON HIGH SEAS FISHERIES FOR RESEARCH AND MANAGEMENT PURPOSES

Introduction

1. The *Ad-hoc* Consultation will consider the requirements for statistics on high seas fisheries for research and management purposes, making particular reference to the Minimum Data Requirements for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks specified in Annex 1 of the Negotiating Text prepared by the Chairman of the UN Conference on Straddling Fish Stocks and highly Migratory Fish Stocks.

2. Regional fishery agencies are the main users of fishery statistics, both for stock assessment and management purposes, and so should have a major input in determining what data should be collected and what data should be reported to them. Agencies have been invited to provide the *Ad-hoc* Consultation with a description of the Agency's requirements for high seas fishery statistics and it is appropriate that these descriptions be used collectively as a basis to consider the specifications in Annex 1. The purpose of this paper is to provide information on the background to the development of the minimum requirements specified in Annex 1.

Background

3. The 1982 United Nations Convention on the Law of the Sea specified duties and responsibilities of States in relation to the conservation of living resources in high seas areas and the collection and exchange of information on high seas fisheries. These provisions are less specific and have proved less effective than equivalent provisions for exclusive economic zones. The particular problems for the high seas have been identified and discussed in several fora and attempts to solve some of these are now underway with the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas and the specification of minimum data requirements for the conservation and management of straddling fish stocks and highly migratory fish stocks.

United Nations Convention on the Law of the Sea (1982 Convention)

4. In Article 56(1) the 1982 Convention recognises that in the exclusive economic zone, the coastal State has "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living".

5. Article 61(1,2) of the 1982 Convention states that coastal States "shall determine the allowable catch of the living resources in its exclusive economic zone" and shall "ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation". It further states that "As appropriate, the coastal State and competent international organizations, whether sub-regional, regional or global, shall cooperate to this end."

6. Article 61(5) of the 1982 Convention states that "Available scientific information, catch and effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations, whether subregional, regional or global, where appropriate and with participation by all States concerned, including States whose nationals are allowed to fish in the exclusive economic zone."

7. Article 62(4) of the 1982 Convention states that the laws and regulations of the coastal State may relate, *inter alia*, to "specifying information required of fishing vessels, including catch and effort statistics and vessel position reports".

8. Thus, the coastal State is responsible for ensuring that the fishery statistics necessary for the design and implementation of proper conservation and management measures are provided for all fishing activity, undertaken by vessels of whatever flag State, within the EEZ of the coastal State. Where appropriate (such as for straddling stocks and highly migratory stock which are also exploited in other EEZs or on the high seas), this should be done in cooperation with competent international organizations.

9. For high seas areas, the situation is quite different. In the absence of sovereign rights for the purpose of managing the living resources, effective management is dependent upon cooperation among States. Article 117 of the 1982 Convention states that "All States have the duty to take, or to co-operate with other States in taking, such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas." Article 118 requires that States "as appropriate, cooperate to establish subregional or regional fisheries organizations to this end".

10. Article 119(2) of the 1982 Convention specifies that "Available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations, whether subregional, regional or global, where appropriate and with participation by all States concerned."

11. The intended effects of Articles 117-119 have generally not been realised. Not all States have taken measures or cooperated with other States in taking measures necessary for the conservation of the living resources of the high seas. This has resulted in an increasing number of fishing vessels being registered in particular States that are not party to international conservation and management measures for the high seas. In addition, for some areas there is no regional fishery organization to implement regulatory measures or to collate and exchange information and statistics (see attached maps). Finally, some flag States do not have a requirement for the reporting of fishery statistics for their vessels when fishing beyond national jurisdiction or in areas where reports are required by particular bilateral or regional agreements.

Declaration of Cancún

12. The International Conference on Responsible Fishing (Cancún, Mexico, 6-8 May 1992) adopted the Declaration of Cancún which included the statement that "high seas fisheries have expanded over the last decade, that the management of high seas fisheries, including the adoption, monitoring and enforcement of effective conservation measures, is inadequate in many areas and that in some areas resources are over-utilized, causing serious concerns for some States with regard to the impact on their fisheries". The same document declared that "States should promote and enhance collection of data necessary for the conservation and sustainable utilization of fisheries resources".

United Nations Conference on Environment and Development (UNCED)

13. The United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, Brazil, 3-14 June 1992) in the section of its Report dealing with "Sustainable use and conservation of marine living resources of the high seas" specified the problems of lack of monitoring and control of high seas fisheries (Paragraph 17.48):

"However, management of high seas fisheries, including the adoption, monitoring and enforcement of effective conservation measures, is inadequate in many areas and some resources are over-utilized. There are problems of unregulated fishing, overcapitalization, excessive fleet size, vessel reflagging to escape controls, insufficiently selective gear, unreliable databases and lack of sufficient cooperation between States. Action by States whose nationals and vessels fish on the high seas, as well as cooperation at the bilateral, subregional, regional and global levels, is essential particularly for highly migratory species and straddling stocks. Such action and cooperation should address inadequacies in fishing practices, as well as in biological knowledge, fisheries statistics and improvement of systems for handling data.....".

14. In consideration of management-related activities, UNCED stated (Paragraph 17.54):

"States should take effective action, consistent with international law, to deter reflagging of vessels by their nationals as a means of avoiding compliance with applicable conservation and management rules, including full, detailed, accurate and timely reporting of catches and effort."

15. On activities in relation to data and information, UNCED stated (Paragraph 17.59):

"States, with the support of international organizations, whether subregional, regional or global, as appropriate, should cooperate to:

(a) Promote enhanced collection of data necessary for the conservation and sustainable use of the marine living resources of the high seas;

(b) Exchange on a regular basis up-to-date data and information adequate for fisheries assessment.

16. In relation to scientific and technological means, UNCED asserted (Paragraph 17.68):

"States with the support of international organizations, whether subregional, regional or global, as appropriate, should:

(a) Develop databases on the high seas marine living resources and fisheries;

(b) Collect and correlate marine environmental data with high seas marine living resources data, including the impacts of regional and global changes brought about by natural causes and by human activities.

Technical Consultation on High Seas Fishing

17. The Technical Consultation on High Seas Fishing (Rome, 7-15 September 1992) considered the requirements for high seas fishery statistics in Paragraphs 8-11 of the Report:

"8. The Consultation agreed on the need for accurate and complete statistical reporting on fisheries in all waters particularly on the high seas fisheries, both for monitoring and evaluating high seas catches and as an essential instrument for research and fisheries management. While recognising the need to adapt the present fishery statistical grids, it was stressed that such reporting should be compatible and consistent with existing established systems for collecting fisheries data so as not to interrupt the historical time series.

"9. Although the Consultation considered that basic data requirements for catch and effort by fishing gear/method were essential for both research and management, it recognized that further studies were needed to determine the detailed requirements for the assessments of high seas stocks. In this connection, the scientific committees of international fishery commission or other relevant regional bodies, as appropriate, where they exist, were considered the most appropriate bodies for identifying the types of data required. In other areas, FAO might take a lead to determine data requirements in consultation with States fishing in the region.

"10. The types of data to be collected would have to take into account their purpose, usefulness, cost, timeliness, burden in collection and collation, as well as regional differences. The Consultation agreed that reporting should ideally include data on catches of targeted species, incidental catches of other utilized species and discards by area and gear.

"11. It was recognized that any increased statistical reporting system would need the cooperation of fishing skippers to record such information, should take into account the time required for analysis of the data, and should be verified, where possible, at landing and processing points and/or through scientific observer schemes."

18. The Consultation also considered the related issues of the level of detail for the reporting of data and the need to protect confidentiality (Paragraphs 13 and 14):

"13. In the discussion on the identification of the appropriate detail for recording high seas catches, the advantages of using geographical references of latitude and longitude squares were noted. The importance of reporting on an oceanic and biological basis covering the whole stock distributions was stressed. In this connection, the reporting by latitude and longitude squares would permit easy aggregation of data on a geographic/biological basis. The "box" principle was not considered appropriate for data collection, because of continuing changes to "box" boundaries, resulting from management actions.

"14. The Consultation acknowledged that some of the information required for stock assessment purposes might be confidential. Protecting confidentiality is important for the cooperation of the fishing industry in the collection of data and such data should be collected, stored and published in a manner to maintain its confidentiality and meet stock assessment requirements. In this connection, it was proposed that FAO should undertake a survey to see how this information may be handled in order to meet both requirements."

19. The Consultation considered the control of fishing effort for fishery management purposes (Paragraphs 54 and 55):

"54. The Consultation noted management problems in certain areas of the high seas, including overcapacity and resultant overfishing.

"55. It was recognized that the access to timely and reliable information on the amount of fishing effort and its geographical distribution was essential for the management of fisheries in the high seas. In this respect, the Consultation noted the merits of observer programmes for high seas fisheries. It was also noted that there is a potential for integrated satellite data transmission systems able to provide timely and reliable data on the position and operation of vessels on the high seas."

UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks

20. The UN Conference on Straddling Fish Stocks and highly Migratory Fish Stocks (New York, 12-30 July 1993) recognized the essential need for reliable fishery statistics as a basis for the provision of advice on rational management of straddling and highly migratory fish stocks. In the Negotiating Text prepared by the Chairman of the Conference (which will be the basis of negotiations which will take place at two further sessions of the Conference in March and August 1994), responsibilities of flag States and of regional organizations in relation to data collection, compilation and dissemination are defined and Annex 1 to the Negotiating Text contains a proposed specification of minimum data requirements for the conservation and management of straddling fish stocks and highly migratory fish stocks.

21. The Negotiating Text specifies the functions of regional fisheries management organizations or arrangements, including the following:

> "18(c) Develop agreed standards for collection, reporting, verification and exchange of data and information on fisheries for the stock(s) in question;
>
> "19(d) Compile and disseminate accurate and complete statistical data, as described in Annex 1, relating to catches of targeted and non-targeted species (both fish and non-fish) and any other relevant information necessary to ensure that the best scientific evidence is available, while maintaining confidentiality where appropriate;"

22. The Negotiating Text also specifies the duties of States in relation to the work of regional or subregional fisheries management organizations, and these include the following:

> "20(a) Ensure that data collection and processing adequately meet scientific assessment requirements and support management objectives:
>
> "20(b) Compile and submit the catch, effort and other relevant data referred to in Annex 1 within an agreed format and time-frame;"

23. Other flag State responsibilities specified in the Negotiating Text include the following measures to be taken:

> "22(g) Requirements for catch verification and validation through agreed observer programmes, inspection schemes, unloading reports, supervision of transshipment, dockside monitoring and monitoring of landed catches and market statistics;
>
> "22(l) Measures to implement, for vessels flying its flag, subregional, regional or global standards for collection of catch, effort and other relevant fisheries data in agreed format and time-frame;"

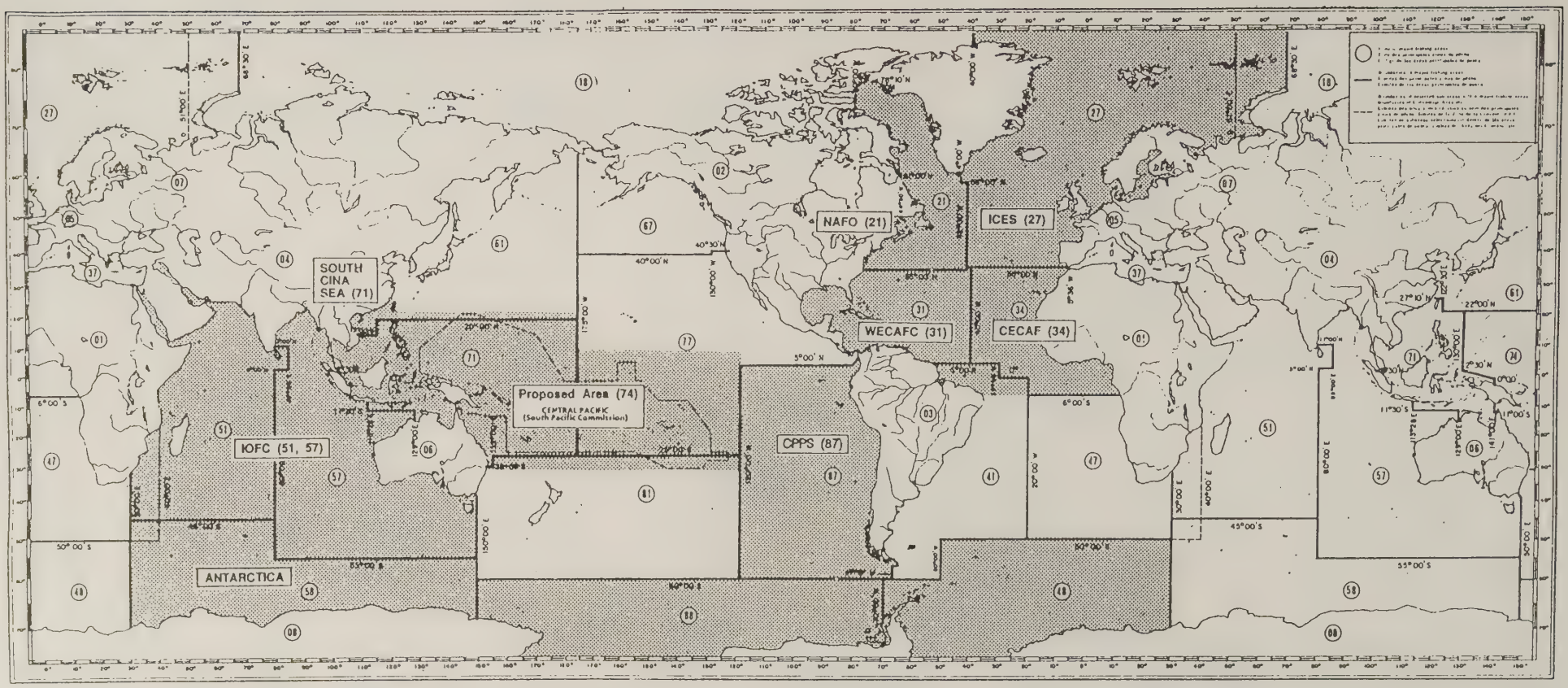
24. Annex 1 of the Negotiating Text contains proposed Minimum Data Requirements for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. It contains a description of the general principles to be considered, the basic requirements for fishery, scientific and vessel data, and procedures for data reporting, validation and exchange. Although it is concerned with data for straddling fish stocks and highly migratory fish stocks which are not restricted to high seas areas, some of its provisions (e.g. Paragraphs 3, 8 and 9) relate exclusively to the high seas, because of the particular need to specify flag State responsibilities for high seas areas.

25. Annex 1 provides an important specification of the "data relevant to the conservation of fish stocks" as referred to in the 1982 Convention Article 119(2) and the general data reporting requirements specified by the Technical Consultation on High Seas Fishing. It takes into account the action and cooperation needed to address the inadequacies in fisheries statistics and data handling systems for the high seas as noted by UNCED, and the functions of regional fisheries management organizations and the responsibilities of States as recognized by the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks.

Action Required

26. Taking the statistical requirements of individual regional fishery agencies into account, the *Ad-hoc* Consultation is invited to specify minimum and, if appropriate, additional requirements for statistics on high seas fisheries for research and management purposes, making particular reference to the Minimum Data Requirements for the Conservation and Management of Straddling fish Stocks and Highly Migratory Fish Stocks specified in Annex 1 of the Negotiating Text prepared by the Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish stocks. It is important to ensure that any statistical collection system implemented for high seas areas is compatible with collection systems implemented for EEZs, while recognizing regional differences, so that consistent data can be assembled for the entire range of straddling stocks and highly migratory stocks.

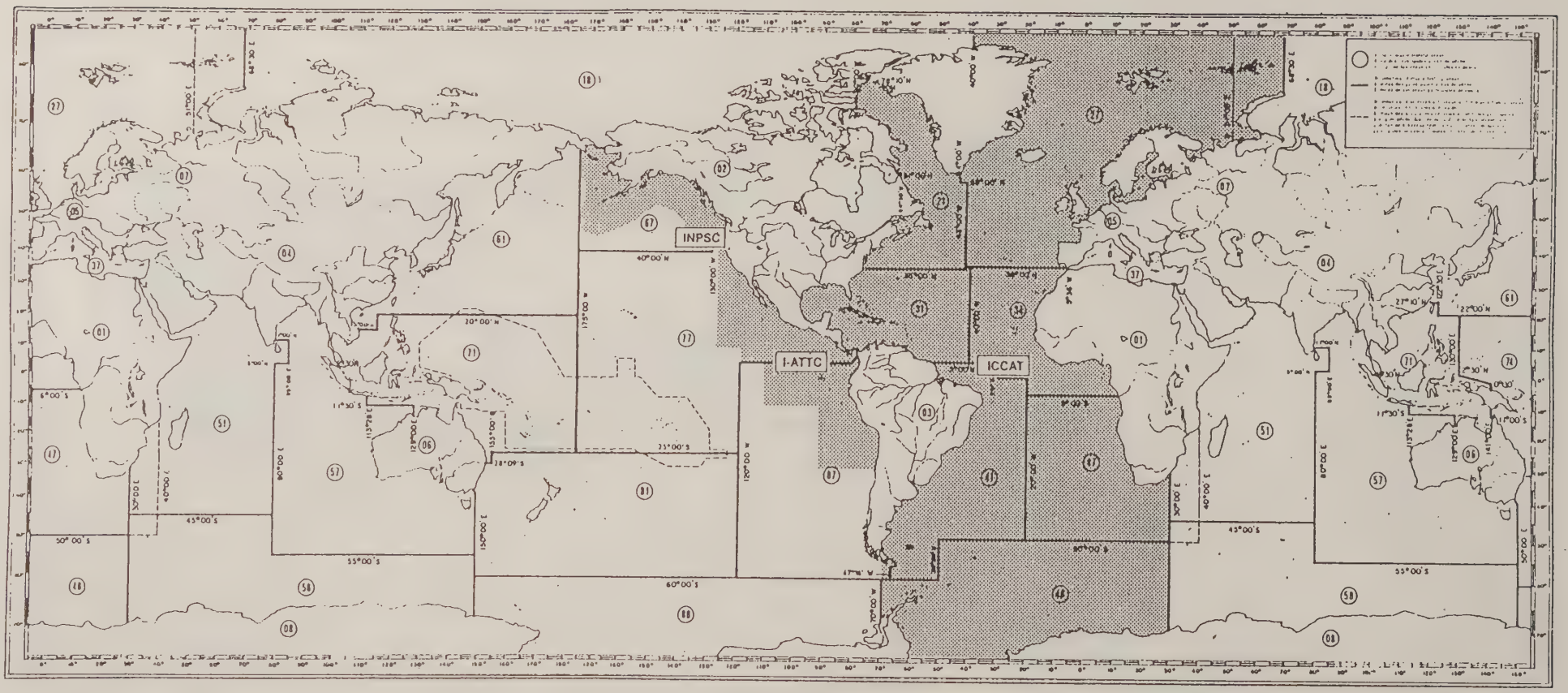
AREAS OF EXISTING REGIONAL FISHERY COMMISSIONS



World Map of FAO Major Fishing Areas for Statistical Purposes

Please note FAO proposed change to establish Major Area 74. The proposed boundary between areas 61, 71 and 74 is on the right side of the map.

AREAS OF COMMISSIONS CONCERNED WITH SPECIFIC SPECIES



World Map of FAO Major Fishing Areas for Statistical Purposes

Please note FAO proposed change to establish Major Area 74. The proposed boundary between areas 61, 71 and 74 is on the right side of the map.

APPENDIX S

MINIMUM DATA REQUIREMENTS FOR THE CONSERVATION AND MANAGEMENT OF STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS

Extract from: United Nations General Assembly. UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, New York, 12-30 July 1993. A/CONF.164/13. Negotiating Text prepared by the Chairman of the Conference.

Annex 1

MINIMUM DATA REQUIREMENTS FOR THE CONSERVATION AND MANAGEMENT OF STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS

1. The timely collection, compilation, analysis and evaluation of data are fundamental for effective fishery conservation and management. These data include catch and fishing effort statistics and other fishery-related information, such as data relating to vessel identity, performance, etc. Data collected in support of conservation and management of target stocks must also include information on associated and dependent species, whether they are fish or non-fish species. Data collected must be verified to ensure accuracy, while maintaining the confidentiality of non-aggregated data to ensure cooperation by industry.

2. Consideration should be given to enhancing training and providing financial and technical assistance to developing countries with regard to building capacity in the field of conservation and management of living marine resources. The fullest possible involvement of developing country scientists and managers in fisheries conservation and management should be promoted. Assistance should focus on enhancing capacity to implement data collection and verification, observer programmes, data analysis and research projects supporting stock assessments.

Fishery Data Collection

3. The following general principles should be considered in defining the parameters for collection, compilation, and exchange of data from high seas fishing operations:

(a) A State is obliged to collect adequate data from vessels flying its flag;

(b) Data should be collected on fishing operations in sufficient detail and in accordance with the nature of the fishery (e.g. individual trawl tow, long-line set, school fished for pole-and-line and purse-seine, day fished for troll) so as to maintain flexibility in the analysis of these data;

(c) Flag States must compile fishery catch and effort data in an internationally agreed format and provide them in a timely manner to the relevant regional fisheries organization or arrangement;

(d) Scientists of the flag State and from the relevant regional fisheries organization or arrangement should analyse these data separately or jointly, as appropriate;

(e) Data collected from each fishery must be disseminated in a timely manner and in an agreed format to the participants in the organization or arrangement.

Basic Fishery Data Requirements

4. As a minimum, the following types of data should be collected concerning all straddling fish stocks and highly migratory fish stocks in sufficient detail to facilitate effective stock assessment:

(a) A time series of historical catch and effort statistics by fleet from the start of the fishery;

(b) Total catch in number and/or nominal weight [defined by FAO as: (landings + losses due to dressing, handling and processing - gains prior to landings) conversion factors] by species of target and non-target species, including non-fish species, as is appropriate to each fishery;

(c) Discard statistics, including estimates where necessary, reported as number and/or nominal weight by species;

(d) Effort statistics appropriate to each fishing methods;

(e) Fishing location, date and time fished, and other statistics on fishing methods as appropriate.

Scientific Data Supporting Stock Assessment

5. In addition to collection, compilation and exchange of fishery data, States are obliged to exchange scientific data. These data should include:

(a) Length, weight and sex composition of the catch, where agreed;

(b) Biological parameters supporting stock assessments and other relevant research, including surveys of abundance, biomass surveys, hydro-acoustic surveys, research on environmental factors affecting stock abundance, and oceanographic and ecological data.

Such data should be exchanged through regional fisheries organizations or arrangements.

Vessel Data and Information

6. The following vessel-related data is required for standardizing fleet composition and vessel fishing power and for converting between different measures of effort in the analysis of catch and effort data:

(a) Vessel identification, flag and port of registry;

(b) Vessel type;

(c) Vessel specifications (e.g. material of construction, date built, registered length, gross registered tonnage, power of main engine(s), hold capacity, catch storage methods);

(d) Fishing gear description (e.g. type, amount and gear specifications).

7. The following information need not be provided if available through other means:

(a) Navigation and position fixing aids;

(b) Communication equipment;

(c) Crew size, etc.

Data Reporting

8. The following data on high seas fishing operations should be sent at frequent intervals to the appropriate national fisheries administrations of coastal States and distant-water fishing nations according to the flag of the fishing vessel:

(a) Catch and effort log books, including data on fishing operations;

(b) Catch and effort reports by radio, telex, facsimile and/or satellite transmission;

(c) Exclusive economic zone entry and exit reports.

Data Verification

9. The following types of fishery information and mechanisms for verifying fishery data should be established for high seas fishing operations:

(a) Position verification by satellite transmission equipment;

(b) Scientific observer programmes to verify catch, effort, catch composition and other details of fishing operations;

(c) Vessel trip, landings and transshipment reports to verify catches;

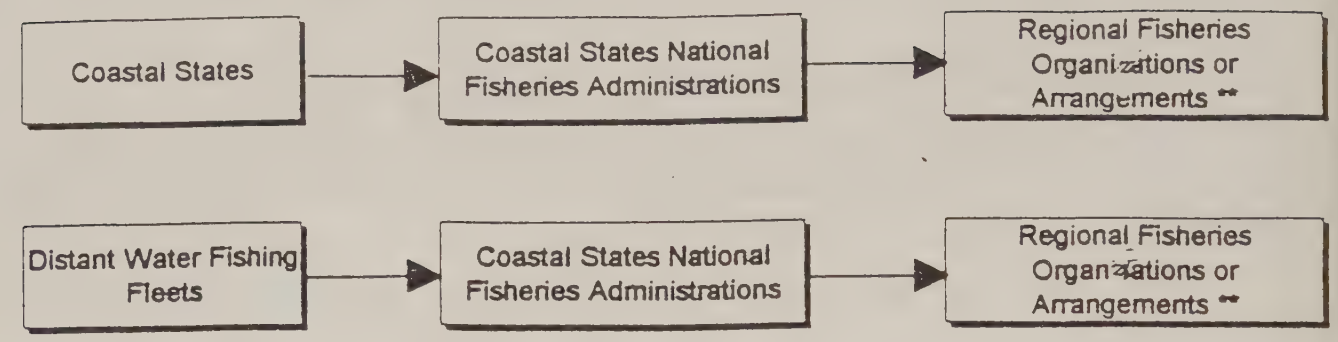
(d) Port sampling to verify catch composition and amount.

Data Exchange

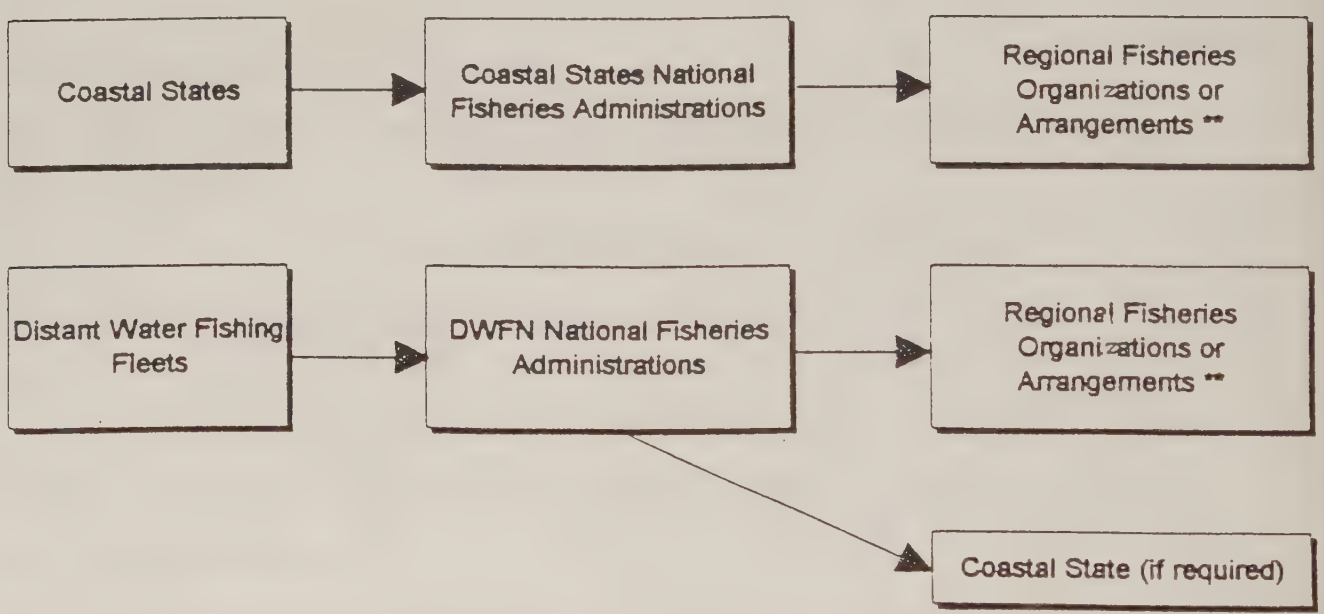
10. Proper conservation and management of straddling fish stocks and highly migratory fish stocks require the availability of relevant fisheries data from the entire stock. Data collected by flag States must therefore be shared through appropriate regional fisheries organizations or arrangements. The regional fishery organization or arrangement shall endeavour to compile data from the stocks as a whole and make data available to all interested parties.

11. The following models of data exchange outline mechanisms currently in effect:

Data Flow Arrangements within Coastal State EEZs


Coastal States
Coastal States National Fisheries Administrations
Regional Fisheries Organizations or Arrangements **
Distant Water Fishing Fleets
Coastal States National Fisheries Administrations
Regional Fisheries Organizations or Arrangements **

Data Flow Arrangements for High Seas Fishing Operations


Coastal States
Coastal States National Fisheries Administrations
Regional Fisheries Organizations or Arrangements **
Distant Water Fishing Fleets
DWFN National Fisheries Administrations
Regional Fisheries Organizations or Arrangements **
Coastal State (if required)

** After compilation, the regional fisheries organization disseminates data to all relevant parties.

At the global level, collection and dissemination of global data should be effected through the Food and Agriculture Organization of the United Nations (FAO). Where a regional organization or arrangement does not exist, FAO may also do the same at a regional level by arrangement with the States concerned.

APPENDIX T

FISHING EFFORT MEASURES BY GEAR CATEGORIES

Level of Priority	Fishing Gear	Effort Measure Descriptors	Definition
A. FIRST	Surrounding nets (purse seines)	Number of sets	Number of times the gear has been set or shot, whether or not a catch was made. This measure is appropriate when school size and packing density is related to stock abundance or sets are made in a random manner.
		or	
		Searching time	This represents time on the grounds less time spent shooting net and retrieving the catch as well as time hove to. This measure is complicated by the use of aircraft spotting as well as by the dissemination of information from vessel to vessel. The measure is appropriate when school size and packing density is unrelated to stock abundance and a set is only made when a school has been located.
	Beach seines	Number of sets	Number of times the gear has been set or shot, whether or not a catch was made.
	Boat seines (Danish seine, etc.)	Number of hours fished	Number of hours during which the seine was on the bottom and fishing.
	Trawls	Number of hours fished	Number of hours during which the trawl was in the water (midwater trawl), or on the bottom (bottom trawl), and fishing.

Level of Priority	Fishing Gear	Effort Measure Descriptors	Definition
	Boat dredges	Number of hours fished	Number of hours during which the dredge was on the bottom and fishing.
	Gillnets (set or drift)	Number of effort units	Length of nets expressed in 100-metre units multiplied by the number of sets made (= accumulated total length in metres of nets used in a given time period divided by 100).
	Gillnets (fixed)	Number of effort units	Length of net expressed in 100-metre units multiplied by the number of times the net was cleared.
	Traps (uncovered pound nets)	Number of effort units	Number of days fished times the number of units hauled.
	Covered pots and fyke nets)	Number of effort units	Number of lifts times the number of units (= total number of units fished in a given time period).
	Longlines (set or drift)	Numbers of hooks	Number of hooks fished in a given time period.
	Pole-and-line	Number of days fished	The number of days (24-hour periods, reckoned from midnight to midnight), on which any fishing took place, including days during which searching took place without fishing.

Level of Priority	Fishing Gear	Effort Measure Descriptors	Definition
	Troll	Number of line-days	Total number of line days in the given time period.
	Jigs, (hand and mechanical)	Number of line-days	Total number of line days in the given time period.
	Harpoons	Number of days fished	The number of days (24-hour periods, reckoned from midnight to midnight), on which any fishing took place, including days during which searching took place without fishing.
B. SECOND	All gears	Number of days fished	The number of days (24-hour period, reckoned from midnight to midnight) on which any fishing took place. For those fisheries in which searching is a substantial part of the fishing operation, days in which searching but no fishing took place should be included in "days fished" data.
C. THIRD	All gears	Number of days on ground	The number of days (24-hour periods, reckoned from midnight to midnight, in which the vessel was on the fishing ground, and includes in addition to the days fishing and searching also all the other days while the vessel was on the ground.

Level of Priority	Fishing Gear	Effort Measure Descriptors	Definition
D. FOURTH	All gears	Number of days absent from port	The number of days absent from port on any one trip should include the day the fishing craft sailed but not the day of landing. Where it is known that fishing took place on each day of the trip the number of "days absent from port" should include not only the day of departure but also the day of arrival back in port. Where on any trip a fishing craft visits more than one "fishing area" (as defined for statistical purposes) an appropriate fraction of the total number of days absent from port should be allocated to each "fising area" in proportion to the number of days spent in each, so that the total number of days absent on the trip will be the sum of the number of days allocated to all of the different "fishing areas" visited.
E. FIFTH	All gears	Number of trips made	Any voyage during which fishing took place in only one "fishing area" is to be counted as one trip. When in a single trip a craft visits more than one "fishing area" an appropriate fraction of the trips should be apportioned to each "fishing area" in proportion to the number of days spent fishing in each, so that the total number of trips for the Statistical Area as a whole will be the same as the sum of trips to each "fishing area".

APPENDIX U

LOGISTICAL AND FINANCIAL IMPLICATIONS ASSOCIATED WITH DATA COLLECTION

Background

1. The Technical Consultation on High Seas Fishing (Rome, 7-15 September 1992) agreed that the "types of data to be collected would have to take into account their purpose, usefulness, cost, burden in collection and collation, as well as regional differences" (paragraph 10). It recognized that any increased statistical reporting system would need the cooperation of fishing skippers to record such information, should take into account the time required for the analysis of the data, and should be verified, where possible, at landing and processing points and/or through scientific observer schemes" (paragraph 11). The Consultation also acknowledged that some of the data required for stock assessment purposes might be confidential. It stated that protecting confidentiality "is important for the cooperation of the fishing industry in the collection of data and such data should be collected, stored and published in a manner to maintain its confidentiality and meet stock assessment requirements" (paragraph 14).

2. The Technical Consultation also emphasised the importance of validation of fishery data (paragraph 28):

> "High priority was attached to the validation of data on catch, effort and by-catch, given that misreporting of commercial data has been seen as a factor leading to errors in scientific assessments. Three mechanisms were given prominence in providing for data validation: the use of observers, the use of auxiliary data from landing and processing points, and technical innovations such as satellite transponders to provide unambiguous information on location and other fishing parameters. Which of these mechanisms for data verification is appropriate varies and depends on the specific application, and was seen as depending on the financial and technical resources of the country concerned."

3. The Technical Consultation also considered the implications for data collection of taking a precautionary approach where assessments are unavailable or uncertain (paragraph 30);

> "It was recognized that scientific assessments with a high degree of uncertainty could lead to the setting of 'preemptive' TACs, or in the extreme case to closures of fishing operations, such as has been implemented in the case of the large whale resources and the high seas drift net fishery. Such pre-emptive closures are seen as a last resort, but should provide an incentive for ensuring that accurate fisheries data are gathered and exchanged between all concerned with management of the high seas resource."

4. The Negotiating Text prepared by the Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks specifies (paragraph 18) that regional fisheries management organizations or arrangements shall:

> "(c) Develop agreed standards for collection, reporting, verification and exchange of data and information on fisheries for the stock(s) in question;
>
> (d) Compile and disseminate accurate and complete statistical data, as described in Annex 1, relating to catches of targeted stock(s) and non-targeted species (both fish and non-fish) and any other relevant information necessary to ensure that the best scientific evidence is available, while maintaining confidentiality where appropriate".

5. The Negotiating Text states (paragraph 20) that, in giving effect to their duty to cooperate in the work of the regional or sub-regional fisheries management organization or arrangement, States shall:

> "(a) Ensure that the data collection and processing adequately meet scientific assessment requirements and support management objectives;
>
> "(b) Compile and submit the catch, effort and other relevant data referred to in Annex 1 within an agreed format and time-frame".

6. The Negotiating Text also specifies (paragraph 22) measures which flag States should take to ensure that their vessels fishing on the high seas comply with conservation and management measures:

> "(j) Installation and use of satellite transmitter equipment (vessel monitoring systems) in accordance with national and regionally integrated systems;"
>
> "(l) Measures to implement, for vessels flying its flag, subregional, regional or global standards for collection of catch, effort and other relevant fisheries data in the agreed format and time-frame".

Action Required

7. The *Ad hoc* Consultation is invited to comment on how the requirements for statistics collection (by fishermen and national institutions) and collation (by the agencies) can best be met within the constraints of minimizing the burden and costs associated with their collection and maintaining confidentiality where necessary, while taking into account the possibilities of cost-effective and reliable automatic recording of fishing activity as well as any special regional requirements.

APPENDIX V

HIGH SEAS FISHERY STATISTICS TO BE COLLATED AND DISSEMINATED BY FAO

Introduction

1. The FAO Technical Consultation on High Seas Fishing, Rome, September 1992 agreed on "the need for accurate and complete statistical reporting in all waters, particularly on the high seas fisheries, both for monitoring and evaluating high seas catches and as an essential instrument for research and fisheries management" (para. 8). "The Consultation appreciated the coordinating role of FAO in the collection and dissemination of aggregated data on world fisheries, and considered that FAO could, through the same mechanisms, coordinate the compilation of aggregated data on high seas fisheries" (para. 16).

2. In response to this statement, FAO included the collection of high seas fishery statistics in its Programme of Work and Budget for 1994/95. Minimal provision of staff resources was made by budgeting for one part-time statistical clerk post. The other responsibilities of that post would be to maintain the database holding the list of vessels authorised to fish on the high seas as proposed in the Draft Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas.

3. The costings and staffing requirements of a high seas statistical programme will depend critically upon the level of aggregation of the data collated by FAO. In determining what type of data FAO should collate and the appropriate level of data aggregation, there are four main categories of considerations which should be taken into account: (i) user requirements, (ii) the avoidance of interruption of existing statistical collation programmes, (iii) the avoidance of unnecessary duplication of data storage, (iv) confidentiality and (v) costs.

Basic Considerations

User requirements

4. The main users of catch and fishing effort statistics have traditionally been stock assessment scientists, fishery economists and fishery managers, and their needs are becoming more demanding of detailed data. Policy makers and those providing advice to policy makers also make use of such data. Their work is extremely important as it addresses the fundamental problem of matching fishing fleet capacity for the high seas to fishing opportunities so as to assure long term sustainability of the stocks and catches.

5. Stock assessment analyses, however, require data which are highly disaggregated by space and time (ideally it should contain haul-by-haul records) and also biological data on the size or age composition of the catches. It is worth noting that the STATLANT B reporting systems used in many Atlantic areas have lost their usefulness because the catch-per-unit-effort data collected by statistical divisions and vessel size class are too aggregated to be useful for most stock assessment work. It is not anticipated that fishery statistics collated by FAO for the high seas would be used for stock assessment purposes. Stock assessments are usually undertaken at national or regional level.

6. The collation by FAO of fishery statistics for the high seas on a global scale would serve two main purposes:

(i) it would provide a basis for describing the fishing activity which takes place on the high seas, together with associated catches, in terms of fishing gear, vessel size, season, area, target and bycatch species; and

(ii) it would serve investigation of the consequences of changes in inputs such as fishery restrictions or fish market prices in terms of redirection of fishing effort.

7. Vessels fishing on the high seas tend to be highly mobile, often moving from one ocean to another, sometimes switching targeting to different species but rarely changing fishing gear type. FAO will hold aggregated data which will probably not permit tracking the activities of individual vessels. Nevertheless, it should be possible to elucidate shifts in fleet fishing activity in terms of vessel type and gear type. In order to describe the performance and behaviour of fleets[1/] and their shifts from one fishery[2/] to another, the concept of a métier[3/] which takes target species into account, can be useful. Information on target species in terms of the fishing skipper's intended catch is rarely collected, so the species composition of the actual catch has to be used as a substitute. There is, therefore, a requirement for fishery-based data on the species composition of the catch and the associated effort data, rather than for species-based data. As earnings are a major determinant of behaviour, it is also extremely important to have value data for each species by fleet and area.

8. Data on the species composition of the catch by vessel size, gear type and area are essential for describing technical interactions among species due to mixed species fisheries (as opposed to biological interactions due to predation). Information on discards is very important for some fisheries but these data are often lacking or are unreliable and cannot easily be verified without observers. When reliable discard data are available, these should be accommodated in the standard statistical programme. The statistics on retained catch and discards should not be restricted to fish but should also include marine mammals, birds and turtles, as there is an increasing demand for information on non-fish mortality associated with fishing activities.

9. Apart from the major traditional uses of fishery statistics, there is also an increasing demand for high seas fishery data at a low level of spatial and temporal aggregation for integration with environmental databases using Geographical Information Systems (GIS) in order to better describe high seas resources and their exploitation in relation to environmental factors.

1/A fleet is defined as a group of similar vessels using similar gear. Support vessels (e.g. fish carriers and motherships) may play an essential part in the operation and performance of a fleet; although they may not be involved in the catching operation and so not feature in the fishing activity data reported, data obtained from support vessels (e.g. quantities of fish transshipped) can be important in validating data from vessels involved in the catching operation.

2/A fishery is defined as a group of vessels (not necessarily similar) targeting the same species or group of species and using similar gears.

3/A métier is defined as a fishing activity characterised by similar vessels using similar gear and targeting the same species or group of species.

Avoidance of interruption of existing statistical collation programmes

10. It is important that any new statistical programme introduced by FAO does not conflict with or interrupt existing programmes for the collation of fishery statistics (e.g. the FISHSTAT NS1 database). In order to ensure this, the statistical questionnaire for the proposed high seas database should be completely separate from the FISHSTAT NS1 questionnaire, at least initially. High seas catch data should currently be reported in the NS1 reporting system, although they are not separately identified. Apart from being restricted to high seas fisheries, the proposed new database would differ from the NS1 database by being disaggregated by gear type and possibly also more spatially disaggregated, and so it would not be appropriate to integrate it with the NS1 reporting system unless the NS1 questionnaire were also modified to provide more detail.

Avoidance of unnecessary duplication of data storage

11. FAO should not hold large quantities of data which are already held by a regional fishery agency at a similar level of aggregation. It would probably be cheaper to closely link the FAO and agency databases using computer networking and integrating software rather than duplicating data collation and storage.

12. It would seem appropriate for FAO to concentrate its efforts on collating data for marine areas falling within the jurisdiction of FAO regional fishery bodies and for those high seas areas and species which are not covered by regional fishery agencies or arrangements. However, for the overall high seas statistical programme to be effective it would be essential to have close cooperation and coordination among the agencies and FAO so as to set standards and ensure effective exchange of high seas data.

Confidentiality

13. Fishing activity and performance data for individual vessels are extremely valuable as they are of great interest to competing fishing interests. In order to ensure as reliable statistical reporting as possible, it is essential for the collecting agency to guarantee confidentiality of the data. Only if fishermen are assured that the logbooks will be kept confidential and, most importantly, not open to the scrutiny of other fishing interests or the tax authorities, will reliable data be recorded. It is for this reason that national authorities or agencies collecting the logbook data ensure that the data are treated as confidential. Fishery statistics based on these data are usually only provided to other agencies in an aggregated form. Generally the aggregations are made to 1° x 1° or 5° x 5° statistical rectangles (e.g. ICCAT) or to larger areas (e.g. NAFO and ICES). Regional fishery agencies usually receive catch and associated effort data in such a form. In some cases regional fishery agencies (e.g. the Inter-American Tropical Tuna Commission) collect data directly from the fishing vessels, and in such cases have access to haul-by-haul or daily data for individual vessels. If reasonably complete data are to be collated for the proposed FAO high seas database, it will be necessary to collect data aggregated at least to 1° x 1° rectangles, and probably to 5° x 5° rectangles.

Costs

14. Obviously, costs must be justified by the expected benefits which a high seas database would provide. It is important that any statistical programme for the high seas established by FAO is sustainable for the foreseeable future and will meet present and emerging needs.

Options in relation to data to be collated by FAO

15. Fishing on the high seas (with the exception of the Mediterranean) is generally undertaken by larger vessels (>24m in length) which are more likely to be required to keep records of their fishing activities than smaller vessels fishing within EEZs, although the requirement to keep logbooks is by no means universal among flag States (particularly for the high seas). However, if the minimum data requirements for the conservation and management of straddling fish stocks and highly migratory fish stocks as specified in the Annex to the Negotiating Text prepared by the Chairman of the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks are adopted, the requirement to record high seas fishing activities in detail will be implemented by more countries. Furthermore, the introduction of remote monitoring of fishing activity by satellite for the high seas could provide such data more reliably. Such a system has been implemented for a "box" in the North Pacific and is being considered by the International Commission for the Conservation of Atlantic Tunas for tuna vessels throughout the Atlantic Ocean. Overall, it might well be that the prospects for obtaining disaggregated data on fishing vessel activity are better for high seas fisheries than for many fisheries inside EEZs.

16. All of the Mediterranean beyond 12 nautical miles from the coast is a high seas area because the coastal states have not extended their fisheries jurisdiction to the limits prescribed in the United Nations Law of the Sea Convention. Because this is a special case of a semi-enclosed sea with inshore vessels being involved in high seas fisheries, it would be more appropriate for disaggregated catch and associated effort data to be collated by the relevant regional fishery bodies (the General Fisheries Council for the Mediterranean and the International Commission for the Conservation of Atlantic Tuna) rather than included in the proposed FAO high seas database. There are also some other areas such as the Yellow Sea where fisheries juristictions have not been extended.

17. Following a description of the level of detail of the data as collected, three possible levels of data aggregation which could be utilised by FAO are considered, together with tentative costings where possible.

Detail of data at source (Box 1)

18. The most detailed data which could be collected would be individual records of each fishing operation, haul by haul. This would correspond to the typical fishing logbook record or to a radio report made under a hail system. If data on discards (e.g. from an observer programme) and on the value of the retained catch (e.g. from market sales records) these data could be combined by national authorities into a record which would typically be structured as shown in Box 1.

19. The advantage of this most disaggregated form of data is that it allows total flexibility for extracting data for specific areas or time periods, and for the definition of fleets or métiers (e.g. according to species composition) as would often be necessary for catch-per-unit-effort analysis for assessment purposes. However, this level of detail would be too demanding for FAO to handle as the quantity of data would be extremely large. In addition, some countries may refuse to provide data in such a form for reasons of confidentiality, and so reporting could be far from complete.

20. Assuming that there are 7,000 vessels fishing on the high seas for an average of 200 days per year and with an average of 4 fishing operations per day, the total number of potential records produced for high seas areas (excluding the Mediterranean) per year would be 5.6 million.

Box 1: Possible structure of record based on source data

- Country of vessel registration
- GRT
- Length
- HP
- Gear type
- Searching gear
- Date
- Time
- Fishing position (mid point)
- Effort (e.g. hours towed, number of hooks. etc.)
- Retained catch weight
  - Species 1
  - Species 2
  - Species 3
  - .
  - .
  - Species n
- Retained catch value
  - Species 1
  - Species 2
  - Species 3
  - .
  - .
  - Species n
- Discarded catch weight
  - Species 1
  - Species 2
  - Species 3
  - .
  - .
  - Species n

Option 1: Aggregation to 1° latitude x 1° longitude rectangles by month (Box 2)

21. Aggregation to 1° latitude x 1° longitude rectangles by vessel size class, gear type and month would be the lowest practical level of aggregation. The individual record could be structured as shown in Box 2.

22. The area contained within a 1° x 1° rectangle varies from 3600 square nautical miles at the equator, to 2550 square nautical miles at latitude 45° and 1800 square nautical miles at 60°. The advantage of this option would be that the geographical resolution would be fine enough to follow high seas/EEZ boundaries fairly closely and to allow a good definition of the distribution of effort and catches, and to allow the data to be useful for GIS. It would also provide some confidentiality.

23. The quantity of data to be processed would, however, be large. Assuming 50 countries submit data for high seas areas (excluding the Mediterranean), with an average of 4 gear/vessel types and an average of 400 rectangles fished per month, the total number of records to be processed per year would be about 1 million.

Box 2: Typical record of fishing activity data aggregated by rectangle

- Country
- GRT class (or length or HP class)
- Gear type
- Year
- Month
- Fishing rectangle
- Total effort (e.g. hours towed, number of hooks. etc.)
- Number of vessels concerned
- Coverage rate (to allow raising to account for incomplete coverage)
- Retained catch weight
  - Species 1
  - Species 2
  - Species 3
  - .
  - .
  - Species n
- Retained catch value
  - Species 1
  - Species 2
  - Species 3
  - .
  - .
  - Species n
- Discarded catch weight
  - Species 1
  - Species 2
  - Species 3
  - .
  - .
  - Species n

Option 2: Aggregation to 5° latitude x 5° longitude rectangles by month (Box 2)

24. The record structure would be the same as for Option 1 (Box 2)

25. The area contained within a 5° x 5° rectangle varies from 90,000 square nautical miles at the equator, to 63,640 square nautical miles at latitude 45° and 45,000 square nautical miles at 60°. This is the level of aggregation used for reporting fishery statistics for tuna in many cases (e.g. Indian Ocean). As the database is to include data only for the high seas, use of this resolution would necessitate the countries reporting only catches taken outside the 200 nautical mile limit for rectangles straddling the high seas/EEZ boundary.

26. Compared to option 1, the number of records to be processed for high seas areas (excluding the Mediterranean) would probably be reduced to about 100,000 per year (i.e. not 25 times smaller than for Option 2 because many 5° x 5° rectangles will be only partly covered).

Option 3: Annual catch data for high seas by major fishing area (Box 3)

27. This would be similar to the existing FISHSTAT NS1 database but would only refer to catches in the high seas parts of the major fishing areas and would be disaggregated by gear type. With such a high level of spatial aggregation, fishing effort data would not be meaningful because data from fisheries targeted on different species would be combined. Although effort would not be included, catch would be specified by gear type. The record structure could be of the form shown in Box 3.

Box 3: Possible record of high seas catch data by major fishing area

- Country
- Year
- Gear type
- Fishing area
- Species
- Catch weight
- Catch value

28. This information would not be useful for describing the various high seas fisheries. To adopt this approach would miss an opportunity to establish a statistical database which would provide users with much more information and flexibility.

29. The number of records for high seas areas (excluding the Mediterranean) would probably be in the order of 4,000 per year (compared to about 11,000 for the existing NS1 database).

Cost and Staffing Considerations

Supervision and Maintenance of Database

30. It is unrealistic for FAO to consider collating unaggregated data for all fishing areas. Such data are held by regional fishery agencies in some, but not most, cases. FAO regional fishery bodies do not collect such data.

31. Rough estimates of staffing needs and other costs are provided for Options 1-3. The numbers

of records cited above can provide a rough guide as to the staff resources required to maintain the database by comparison with maintaining existing databases. The volume of data processed under Options 1 and 2 would be much greater than for the FAO FISHSTAT NS1 database (approximately 11,000 records per year), both in terms of the number of records and the record size. However, high seas statistics would be provided by far fewer countries and these countries would generally be in a position to provide data in electronic format. Less time would be required for manual data entry than for the NS1 data but, given the larger volume of data for the high seas, more time would be spent on data validation and correction.

32. Thus it should be possible for 1 half time G-4 data clerk to maintain the data under Option 2, but not under Option 1. The staff resources necessary to maintain the database will not be directly proportional to the number of records processed because much time is spent resolving problems related to submission formats which, once resolved, generally mean that all data for the submission can be entered into the database. It is likely, therefore, that Option 1 could be handled by 2 full time data clerks, but it is doubtful if current FAO resources could support this for the immediate future.

33. Minimal provision has been made in the Programme of Work and Budget (PWB) for 1994/95 in the form of one data clerk post for data processing of high seas fishery statistics and maintenance of the list of vessels authorised to fish on the high seas. In endorsing the PWB, however, the FAO Committee for Fisheries noted that there may also be a need to provide additional resources from extra-budgetary funds to undertake the work in relation to the vessel list.

34. No budgetary provision has been made for supervision of the high seas statistical programme. The data collation and maintenance will require some supervision, but extensive supervision will be required under Options 1 or 2 for processing and analyzing the data for dissemination and in response to *ad hoc* requests. Such work would probably require half the time of one professional post.

35. FAO would disseminate data in its most disaggregated form (i.e. by 1° x 1° or 5° x 5° rectangles or major fishing areas for Options 1-3, respectively) subject to any restrictions concerning confidentiality specified by the suppliers of the data. High seas fishery data aggregated to major fishing area level (i.e. compatible with the NS1 detail) could be published in additional tables in the FAO Yearbook of Fishery Statistics: Catches and Landings.

36. The annual additional costs for staffing (at FAO standard rates), publications and dissemination of data for each Option would be approximately:

Option 1:	US$	230 000
Option 2:	US$	120 000
Option 3:	US$	85 000

37. These costs compare with staffing, publication and dissemination of global catches and landings statistics by major fishing area of approximately US$400 000 per year.

Establishment of Database

38. For Options 1-3, the existing database software (INGRES) could be utilized and run on the existing Departmental Microvax 4000 computer. The database would have to be structured and procedures written to handle data input, searches, extractions and report production. This work could be done by a consultant database expert and would take about 1 year and cost approximately US$120 000.

Action Required

39. The *Ad hoc* Consultation is requested to provide advice on the type of data high seas fishery data and level of aggregation which would be appropriate for FAO to collate and disseminate. Account should be taken of the present and expected future needs for fishery-based rather than species-based data, for bycatch information, for information on values, and for spatial and temporal resolution, as well as the cost implications. The Options are presented to illustrate a range of possibilities rather than discrete choices; intermediate combinations are also possible.

APPENDIX W

REPORTING AND EXCHANGE OF HIGH SEAS FISHERY STATISTICS

1. Under Agenda Item 4 the *Ad hoc* Consultation will have reviewed the high seas fishery statistics collected and collated by different regional fishery agencies.

2. Under Agenda Item 6 the *Ad hoc* Consultation will have considered how the requirements for statistics collection (by fishermen and national institutions) and collation (by the agencies) can be met effectively and efficiently while maintaining confidentiality. The possibilities of using reliable automatic recording of fishing activity which could transmit data to the flag State in real time will have been considered.

3. Under Agenda Item 7 the *Ad hoc* Consultation will have considered the high seas fishery statistics to be collated and disseminated by FAO and, in particular, the appropriate level of detail.

4. It is essential that reporting of data to FAO for the new high seas database be harmonised as much as possible with systems already in use by regional fishery agencies. For those fishing areas not covered by a regional fishery agency, FAO will collate data from national sources, where possible.

Action Required

5. In the light of discussions under Agenda Items 4, 6 and 7, and recognising the need to try to reduce demands on national authorities reporting to more than one agency, the *Ad hoc* Consultation is invited to comment on whether it would be desirable or feasible to harmonise reporting systems for all high seas areas, and whether FAO could utilise the same system for collating data for the proposed database on aggregated high seas fishery statistics.

APPENDIX X

ROLE OF THE COORDINATING WORKING PARTY ON ATLANTIC FISHERY STATISTICS (CWP)

Background

1. An Expert Meeting on Fishery Statistics in the North Atlantic Area (Edinburgh, Scotland, 22-29 September 1959), sponsored by FAO, the International Council for the Exploration of the Sea (ICES) and the International Commission for Northwest Atlantic Fisheries (ICNAF) which was the predecessor to the Northwest Atlantic Fisheries Organization (NAFO), met to consider the requirements for fishery statistics for the North Atlantic and to recommend definitions and classifications and the coordination of statistics collection among the various international organizations. Seventy participants and observers from fourteen countries and international organizations attended the meeting.

2. The statistical requirements of fishery scientists (fishery biologists and gear technologists), economists, food technologists, fishery administrators, businessmen and industrial organizations were considered. The requirements were specified primarily as catch quantity and value by species (output) and effective fishing effort (input) and the corresponding economic input statistics specified as to area or fishery and time.

3. The meeting proposed common definitions and classifications for the collection of statistics on catches, fishing effort, manpower (fishermen) and fishery commodities. It proposed the reporting system for landing statistics operated by FAO be retained and that the FAO International Standard Statistical Classification of Aquatic Animals and Plants be used by ICNAF and ICES. It further proposed that a standard form be developed for the reporting of catch and associated effort data to ICES, ICNAF and FAO. The forms would be dispatched by FAO to member countries who would return two copies, one to FAO and the other to either ICNAF or ICES, as appropriate. It recommended that the quantity of fish reported as unsorted and unidentified should not exceed 10% of the total nominal catch of a country or 10,000 tons, whichever is less. Where necessary, sampling schemes should be used to determine the species compositions.

4. The meeting also recommended that observer programmes be undertaken to collect data on discards at sea, and that conversion factors for the estimation of live weight equivalent catch from landed product weight be estimated nationally and collated by FAO. Importantly, it recommended that the flag of the vessel should be used to determine the country of origin of direct foreign landings and that countries should exchange information on such landings.

5. It was recommended that governments give increased attention to the regular collection of information on commodity and product output and disposition, including stocks or holdings. The meeting reviewed and proposed the FAO International Standard Classification of Fishery Commodities for use in the North Atlantic area and asked FAO to draw the attention of other international agencies interested in fishery commodity statistics to this classification.

6. The meeting recommended that price and value statistics for the first point of sale be reported as should the prices and values of inputs (i.e. costs).

7. Having specified in considerable detail the common definitions, classifications and standards which should be used for the collection of fishery statistics for the North Atlantic, the meeting further proposed the following:

"(i) The Meeting invites the Governments of Canada, the Federal Republic of Germany, Iceland and the United Kingdom, and ICES, ICNAF and FAO to appoint one expert each to form a continuing Working Party on Fishery Statistics in the North Atlantic area with the power to co-opt additional members to help them in their tasks.

"(ii) The Working Party should keep under continuous review the progress made in the implementation of the recommendations of the Meeting, consult with the officers of governments and of international organizations with respect to difficulties encountered and, keeping in mind the actual state of fishery statistical services in the different countries, make suggestions for further national and international action in its field to governments and international organizations as appropriate.

"(iii) The Meeting requests the Director-General of the Food and Agriculture Organization of the United Nations to arrange for its Fisheries Division to function as Secretariat for the meetings of this Working Party."

8. The Continuing Working Party on Fishery Statistics in the North Atlantic Area (CWP) was established by the FAO Conference at its Tenth Session (1959, Resolution 23/59) precisely as proposed by the Meeting and authorized and requested "the Director General to establish the Working Party in accordance with Article VI of the FAO Constitution and to arrange for the FAO Fisheries Division to function as secretariat for the Working Party".

9. Subsequently, ICES and ICNAF agreed to participate in and support the CWP and the four national governments agreed to provide experts to participate.

10. Five meetings of the Working Party were held before the FAO Council, at its Fifty-first Session (1968, Resolution 1/51), altered the title of the Working Party to the Coordinating Working Party on Atlantic Fishery Statistics (also abbreviated to CWP). Participation by the four national experts at subsequent Sessions ceased and participation of agency experts expanded and the complete list of agencies which have provided participants is as follows: FAO, ICES, Northwest Atlantic Fisheries Organization (NAFO, formerly ICNAF), International Commission for the Conservation of Atlantic Tuna (ICCAT), International Commission for the Southeast Atlantic Fisheries (ICSEAF, subsequently ceased to exist), Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), North Atlantic Salmon Conservation Organization (NASCO), Organization for Economic Cooperation and Development (OECD) and Statistical Office of the European Communities (EUROSTAT).

11. Altogether the Working Party has held fifteen Sessions, generally meeting about every two years.

Role of the CWP

12. The CWP supported by the participating agencies served since 1960 as the premier international and inter-agency forum for agreeing common definitions, classifications and standards for the collection of fishery statistics. It has also developed common procedures for statistics collation which have streamlined the collation prodess and reduced the burden on national fisheries statistical offices. No such coordinating body exists for agencies in other regions. It has provided technical advice on fishery statistical matters to participating agencies and has facilitated the publication of methodological and reference documents of general interest. In the process it has shaped the statistical programmes of all participating agencies to some extent, and those of FAO in particular, while leaving member agencies with complete autonomy in their area of responsibility.

13. Catch and effort data have been collected for different major fishing areas in the Atlantic using questionnaires applying common classifications and definitions and designed to a common style but tailored to the particular needs of the relevant regional fisheries agency. This reduces the burden on countries completing questionnaires for more than one major fishing area by applying common systems and standards. For example, conventions as to the reporting of catches by country in relation to joint venture fishing operations or vessel chartering can be applied universally. These questionnaires, originally called STANA and now called STATLANT, are despatched together with instructions for completion by FAO on behalf of the regional fishery agencies to the relevant national authorities.

14. STATLANT A questionnaires are used for reporting annual nominal catch by species and by statistical sub-area, division or sub-division. STATLANT B questionnaires are used for reporting fishing effort by month, vessel size class, gear and statistical sub-area, division or sub-division and together with associated catch by species. In some cases the species sought (target species) are also specified.

15. STATLANT A and B questionnaires have been used by CCAMLR to collate statistics for major fishing areas 48, 58 and 88 (Southern Oceans), by NAFO for area 21 (Northwest Atlantic), by ICES for area 27 (Northeast Atlantic), by CECAF for area 34 (Eastern Central Atlantic), and by GFCM for area 37 (Mediterranean and Black Sea). Even though the Regional Fisheries Advisory Commission for the Southwest Atlantic (CARPAS) has never convened a meeting and ICSEAF has been terminated, FAO still despatches STATLANT 41A, 47A and 47B questionnaires and stores the returns; however, not much use is being made of these now and the CWP will need to consider whether continuation of the STATLANT 41 and 47 reporting systems can be justified.

16. Changes in the nature of the fisheries and in the needs of users of fishery statistics necessitate frequent reviews of the statistical systems. For example, the STATLANT B reporting system is no longer providing appropriate data for stock assessment purposes in some areas; it will be terminated for the Northeast Atlantic and is under review for the Mediterranean. The CWP at its next Session in July 1994 will consider possible modification of the STATLANT 21A, 21B and 27A reporting systems in order to separately identify catches from high seas areas.

17. The FISHSTAT reporting system is used by FAO to collate global statistics on catch and production from over 220 countries for over 1,000 species of aquatic organisms of significant commercial importance in all inland and marine fishing areas. It is run in parallel with the STATLANT system in areas where the latter is operated. CWP has also concerned itself with reconciling the catch data held by the regional fishery agencies with the FAO FISHSTAT data.

18. The CWP at its Fifteenth Session considered the problems associated with the collection of fishery statistics but which are accentuated for the high seas (e.g. flags of convenience, trans-shipments, landings into foreign ports, processing at sea) and noted the particular need for special effort and collaboration among national authorities, regional and international agencies to ensure complete and accurate reporting of the data.

19. The CWP has also contributed to the elaboration of a definition of aquaculture and agreed a common questionnaire (FISHSTAT AQ) for the reporting of aquaculture statistics to FAO and to some of the regional fishery agencies. It was also involved in designing a single inquiry undertaken by FAO on recreational fisheries.

20. In its earlier Sessions, the CWP devoted a considerable amount of attention to systems for the collection of commodity and trade statistics, as well as statistics on the disposition of catches. However, in later Sessions with the emphasis shifting more towards coordinating the statistical

systems of the regional fishery agencies, commodity, trade and disposition statistics have been considered less despite the Edinburgh Conference having emphasised their importance and that fact that they can often be used for verification of catch statistics as was stressed by the Technical Consultation on High Seas Fishing (paragraph 28). Although commodity, trade and disposition statistics have not recently been the subject of much consideration by the CWP, issues in relation to consumption statistics based on food balance sheets which utilise those statistics have been addressed. Some agencies (e.g. ICCAT and NPAFC) are using trade data in conjunction with certification of origin to verify catch data for certain species.

21. Similarly, not much attention has been devoted to data series of interest to only some of the participating agencies (e.g. fleet statistics, employment statistics).

22. The CWP has also considered ancillary issues such as standard formats to facilitate the exchange of data using electronic media.

AD HOC Consultations on Global Tuna Statistics

23. The *Ad hoc* Consultation on Global Tuna Statistics (Colombo, Sri Lanka, 6-7 December 1985) agreed that each tuna agency was in the best position to collect, improve and comment on the data for its own area of responsibility and that they, therefore, had a vital role to play in improving data at the global level. It further agreed that some form of inter-agency collaboration was essential if improved coverage and more reliable global tuna statistics were to become a reality and that there was a need to establish some mechanism like the CWP for the coordination of statistical programmes for agencies concerned with tuna statistics.

24. The Second *Ad hoc* Consultation on Global Tuna Statistics (La Jolla, California, 21-22 May 1987) further considered the advantages and disadvantages of establishing a formal body to coordinate tuna statistical programmes. The consensus view was that "(1) it would be more desirable to formalize the group rather than continue in an *ad hoc* fashion; and (2) the most advantageous way to accomplish this would be to formalize as an FAO body rather than under one of the regional agencies or the CWP".

25. Such a coordinating body for agencies concerned with tuna statistics has not yet been formed, however.

Future Role of the CWP

26. At its last meeting in July 1992, CWP recommended that the word "Atlantic" be dropped from its title so as to encourage the participation of agencies concerned with areas outside the Atlantic and so facilitate the discussion of issues of global significance such as high seas fishery statistics. At its next meeting, hopefully with representatives of non-Atlantic agencies present, the CWP could consider the possible modification of its statutes and terms of reference so as to extend its brief to other Oceans and modify the provisions for membership accordingly.

Action Required

27. The *Ad hoc* Consultation is invited to comment on whether there is a need for a mechanism to coordinate fishery statistical programmes of different agencies outside the Atlantic Ocean, and if so, what might be the appropriate form for it to take. In particular, it would be very useful to obtain the views of as many regional agencies as possible in relation to a possible extended geographical role for CWP prior to the next CWP meeting (in July 1994).

APPENDIX Y

PROVISION BY FAO OF INFORMATION ON THE AUTHORIZATION OF VESSELS TO FISH ON THE HIGH SEAS

Agreement on the Flagging of Vessels Fishing on the High Seas

1. The FAO Conference (Rome, 6-25 November 1993) adopted the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. The Agreement will form an integral part of the International Code of Conduct for Responsible Fishing which was called for in the Declaration of Cancun.

2. The aim of this Agreement is to deter the flagging of vessels as a means of avoiding compliance with conservation and management rules for fishing activities on the high seas and to encourage flag States to fulfil their responsibilities with respect to fishing vessels entitled to fly their flags and operating on the high seas. The means employed within the Agreement to achieve this objective include specifying flag States' responsibility in respect of fishing vessels entitled to fly their flags and operating on the high seas, including the authorization by the flag State of such operations, as well as through strengthened international cooperation and increased transparency through the exchange of information on high seas fishing.

3. Article IV of the Agreement states:

> "Each Party shall, for the purposes of this Agreement, maintain a record of fishing vessels entitled to fly its flag and authorized to be used for fishing on the high seas, and shall take such measures as may be necessary to ensure that all such fishing vessels are entered in that record."

4. Article II (2) states:

> "A Party may exempt vessels of less than 24 metres in length entitled to fly its flag from the application of this Agreement unless the Party determines that such an exemption would undermine the object and purpose of this Agreement ....".

5. Article III (5) states:

> "(a) No Party shall authorize any fishing vessel previously registered in the territory of another Party that has undermined the effectiveness of international conservation and management measures to be used for fishing on the high seas, unless it is satisfied that
>
> (i) any period of suspension by another Party of an authorization for such fishing vessel to be used for fishing on the high seas has expired; and
>
> (ii) no authorization for such fishing vessel to be used for fishing on the high seas has been withdrawn by another Party within the last three years."

6. Article III (7) states:

> "Each party shall ensure that each fishing vessel entitled to fly its flag shall provide it with such information on its operations as may be necessary to enable the Party to fulfil its obligations under this Agreement, including in particular information pertaining to the area of its fishing operations and to its catches and landings."

7. Article VI concerns the exchange of information, and is quoted in full in the Annex to this paper.

8. The present paper is concerned with the means and procedures by which FAO will provide, as specified in Paragraphs 4 and 10 of Article VI, the information (i) to Parties and (ii), subject to any restrictions on the provision of such information imposed by the Party concerned, to global, regional or subregional fisheries organizations.

Maintenance of International Vessel Record Database by FAO

9. FAO made certain provisions for this work in its Programme of Work and Budget for 1994/95. The FAO Committee on Fisheries in March 1993 noted, however, that there may also be a need to provide additional resources from extra-budgetary funds to undertake this work. The FAO Conference in November 1993 "recognized that the entry into force of the Agreement would entail additional expenses for FAO in carrying out its role thereunder and that the necessary funds would have to be found in due course" (C 93/REP/11, Paragraph 9).

10. FAO will have to establish a database to accommodate the International Record of Fishing Vessels which would comprise the information listed in Article VI Paragraph 1 of the Agreement and, to the extent practicable, the information listed in Article VI Paragraph 2. In addition, associated textual information as provided under Article VI Paragraphs 5-9 would be stored.

Supervision and Maintenance of Database

11. It will be necessary to exercise close and strict supervision of the International Record of Fishing Vessels in order to ensure (i) that the list of vessels authorised to fish on the high seas is maintained in an up-to-date state, (ii) that the data are thoroughly screened, (iii) that prompt and accurate dissemination of data is achieved by FAO, both in periodic reports and in response to *ad hoc* requests, and (iv) that the restrictions on dissemination of some of the data for reasons of confidentiality, as provided for in the Agreement, are adhered to. The work will necessarily involve much communication with national authorities and regional fisheries organizations.

12. The number of records is not expected to be large (probably no more than 10,000) and the record size will be small with a minimum of 18 items as listed in Box 1.

Box 1: Database record items in the International Record of Fishing Vessels

1. name, port of registry, and previous names (if known);
2. previous flag (if any);
3. International Radio Call Sign (if any);
4. name and address of owner or owners;
5. where and when built;
6. type of vessel;
7. length;
8. name and address of manager or managers (if any);
9. type of fishing method or methods;
10. moulded depth;
11. beam;
12. gross register tonnage;
13. power of main engine or engines;
14. current status - authorized/not authorized
15. date of last authorization;
16. reference to notes on additions to record;
17. reference to notes on deletions from the record;
18. reference to notes on contraventions;
19. confidentiality specifications.

The notes referred to in items 16-18 may be held in associated text files.

13. Once established, the data maintenance would not be very demanding of staff resources. Assuming 20% of the records are replaced every year, and that it takes on average 20 minutes to enter and validate each record and any notes on contravention (including occasional communications with national authorities concerning problems), data maintenance, assuming data entry is manual, would take about 100 working days per year. It is most likely that the major countries would provide the data in computer files (using a standard format) and this could reduce the staff time needed for data entry, to perhaps 80 days. Allowing another 50 days for report production and responding to *ad hoc* requests, an estimate of 130 days per year for data maintenance and reporting would be expected.

14. The means and procedures suggested here would provide:

(i) staff available during normal working hours to update the database with additions, deletions and modifications to the list of vessels;

(ii) staff available during normal working hours to answer *ad hoc* enquiries made by telefax, telex, etc.;

(iii) a continuous direct log-on inquiry service to authorized users via network or modem/dial up to extract information (read only) to answer most of the *ad hoc* requests.

Establishment of Database and Network Access

15. Existing database software and hardware could be utilized. The database would have to be structured and procedures written to handle data input, searches, extractions and report production.

This work could be done by a consultant database expert. Extra assistance would be required for data entry at the beginning when the records are being entered for the first time.

Communications

16. In order to ensure ready access to the International Record of Fishing Vessels for Parties to the Agreement (including in some cases, by agreement, their surveillance ships and aircraft) and regional agencies, it may be necessary to utilize satellite communication which would provide voice, telefax, telex and file transfer communications.

17. Direct log-on access to authorised users (national and regional agencies) for enquiries and general electronic mail services should be provided through wide-area computer networks (e.g. Internet) or telephone dial-up modem. Assuming that FAO obtains an Internet node as currently planned, only running costs would be required for the network. It may be necessary to hire a communications consultant to establish read-only access facilities to users via wide-area networks. This work would take about two months.

Action Required

18. The *Ad hoc* Consultation is invited to comment on the appropriateness of the suggested means and procedures for FAO to accommodate the International Record of Fishing Vessels, particularly in relation to the provision of information to regional fisheries organizations.

Annex

Extract from the Agreement to Promote Compliance with Internatonal Conservation and Management Measures by Fishing Vessels on the High Seas:

Article VI

EXCHANGE OF INFORMATION

1. Each Party shall make readily available to FAO the following information with respect to each fishing vessel entered in the record required to be maintained under Article IV:

(a) name of fishing vessel, registration number, previous names (if known), and port of registry;

(b) previous flag (if any);

(c) International Radio Call Sign (if any);

(d) name and address of owner or owners;

(e) where and when built;

(f) type of vessel;

(g) length.

2. Each Party shall, to the extent practicable, make available to FAO the following additional information with respect to each fishing vessel entered in the record required to be maintained under Article IV:

(a) name and address of operator (manager) or operators (managers) (if any);

(b) type of fishing method or methods;

(c) moulded depth;

(d) beam;

(e) gross register tonnage;

(f) power of main engine or engines.

3. Each Party shall promptly notify to FAO any modifications to the information listed in paragraphs 1 and 2 of this Article.

4. FAO shall circulate periodically the information provided under paragraphs 1, 2 and 3 of this Article to all Parties, and, on request, individually to any Party. FAO shall also, subject to any restrictions imposed by the Party concerned regarding the distribution of information, provide such information on request individually to any global, regional or subregional fisheries organization.

5. Each Party shall also promptly inform FAO of -

(a) any additions to the record;

(b) any deletions from the record by reason of -

(i) the voluntary relinquishment or non-renewal of the fishing authorization by the fishing vessel owner or operator;

(ii) the withdrawal of the fishing authorization issued in respect of the fishing vessel under paragraph 8 of Article III;

(iii) the fact that the fishing vessel concerned is no longer entitled to fly its flag;

(iv) the scrapping, decommissioning or loss of the fishing vessel concerned; or

(v) any other reason.

6. Where information is given to FAO under paragraph 5 (b) above, the Party concerned shall specify which of the reasons listed in that paragraph is applicable.

7. Each Party shall inform FAO of

(a) any exemption it has granted under paragraph 2 of Article II, the number and type of fishing vessel involved and the geographical areas in which such fishing vessels operate; and

(b) any agreement reached under paragraph 3 of Article II.

8. (a) Each Party shall report promptly to FAO all relevant information regarding any activities of fishing vessels flying its flag that undermine the effectiveness of international conservation and management measures, including the identity of the fishing vessel or vessels involved and measures imposed by the Party in respect of such activities. Reports on measures imposed by a Party may be subject to such limitations as may be required by national legislation with respect to confidentiality, including, in particular, confidentiality regarding measures that are not yet final.

(b) Each Party, where it has reasonable grounds to believe that a fishing vessel not entitled to fly its flag has engaged in any activity that undermines the effectiveness of international conservation and management measures, shall draw this to the attention of the flag State concerned and may, as appropriate, draw it to the attention of FAO. It shall provide the flag State with full supporting evidence and may provide FAO with a summary of such evidence. FAO shall not circulate such information until such time as the flag State has had an opportunity to comment on the allegation and evidence submitted, or to object as the case may be.

9. Each Party shall inform FAO of any cases where the Party, pursuant to paragraph 5 (d) of Article III, has granted an authorization notwithstanding the provisions of paragraph 5 (a) or 5 (b) of Article III. The information shall include pertinent data permitting the identification of the fishing vessel and the owner or operator and, as appropriate, any other information relevant to the

Party's decision.

10. FAO shall circulate promptly the information provided under paragraphs 5, 6, 7, 8 and 9 of this Article to all Parties, and, on request, individually to any Party. FAO shall also, subject to any restrictions imposed by the Party concerned regarding the distribution of information, provide such information promptly on request individually to any global, regional or subregional fisheries organization.

11. The Parties shall exchange information relating to the implementation of this Agreement, including through FAO and other appropriate global, regional and subregional fisheries organizations.

APPENDIX Z

ACRONYMS USED IN THIS REPORT

CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CECAF	Fishery Committee for the Eastern Central Atlantic (FAO Regional Body)
CWP	Coordinating Working Party on Atlantic Fishery Statistics
EEZ	Exclusive Economic Zone
Eurostat	Statistical Office of the European Communities
FAO	Food and Agriculture Organization of the United Nations
FFA	South Pacific Forum Fisheries Agency
GFCM	General Fisheries Council for the Mediterranean (FAO Regional Body)
GRT	Gross Registered Tonnage
IATTC	Inter-American Tropical Tuna Commission
IBSFC	International Baltic Sea Fisheries Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
ICSEAF	International Commission for the Southeast Atlantic Fisheries (ceased: 1990)
IPTP	Indo-Pacific Tuna Programme (FAO Regional Body)
IOTC	Indian Ocean Tuna Commission
MCS	Monitoring, control and surveillance
NAFO	Northwest Atlantic Fisheries Organization (previously **ICNAF** - International Commission for the Northwest Atlantic Fisheries, ceased in 1979)
NASCO	North Atlantic Salmon Conservation Organization
NEAFC	Northeast Atlantic Fisheries Commission
NMFS	US National Marine Fisheries Service
NPAFC	North Pacific Anadromous Fish Commission (previously **INPFC** - International North Pacific Fisheries Commission, ceased in 1993)
SEAFDEC	Southeast Asian Fisheries Development Centre
SPC	South Pacific Commission
STATLANT	STATistical Programme for the AtLANTic Fisheries (previously STANA)
TBAP	Tuna and Billfish Assessment Programme

The Ad Hoc Consultation on the role of Regional Fishery Agencies in Relation to High Seas Fishery Statistics, organized by FAO, was held at the headquarters of the Inter-American Tropical Tuna Commission (IATTC), La Jolla, California, USA, from 13 to 16 December 1993. The following items were discussed: review of statistics reported on high seas fisheries and at present collated by regional fishery agencies; specification of the requirements for statistics on high seas fisheries for research and management purposes; logistical and financial implications associated with data collection; advice on the high seas fishery statistics to be collected and disseminated by FAO; reporting of high seas fishery statistics and exchange of data between regional fishery agencies and FAO; the Coordinating Working Party on Atlantic Fishery Statistics (CWP) and its possible extension to areas outside the Atlantic Ocean; and exchange of information between FAO and regional fishery agencies concerning the authorization of vessels to fish on the high seas.

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